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ABSTRACT

This packet provides sample lessons from the program "Stones and Bones: A Laboratory Approach to Physical Anthropology." The samples are from the unit of 20 lessons that are investigative-oriented for students to explore anthropological topics. Unit 1, "In Search of Human Ancestors. How We Study Our Past: Stories Told by Fossils," includes activities on: (1) "My Family Tree--An Historical Record"; (2) "The Hominid Tree: A Pre-Historical Record"; and (3) "Tools: The Human Hand." Unit 9, "Homo Erectus: Humans of the Pleistocene," contains lessons on: (1) "Geographical Distribution of Homo Erectus"; (2) "Comparative Morphology of Homo Erectus"; and (3) "How Homo Erectus Lived." Unit 10, "Principles of Taxonomy: An Introduction," includes lessons on: (1) "Descriptions"; and (2) "Groupings." Unit 17, "Neandertals: Beginnings of Spiritual Awareness," contains lessons on: (1) "Geographic Distribution of Neandertals"; (2) "Morphology of Neandertal Skulls"; and (3) "Behavior of Neandertals." Contains many pages describing various features of the program and an order form. (EH)

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Stones and Bones:
A Laboratory Approach to Physical Anthropology,
Grades 7-12

EXPLORATION 1

IN SEARCH OF HUMAN ANCESTORS

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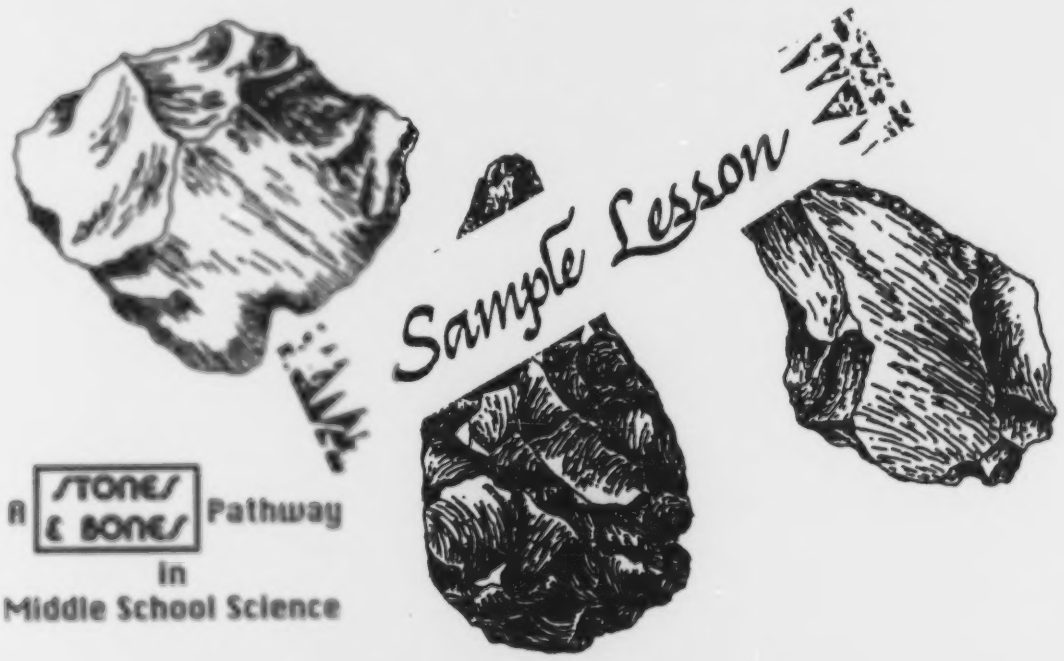

A STONES & BONES Pathway in Middle School Science

HOW WE STUDY OUR PAST

Stories Told by Fossils

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EXPLORATION 1

IN SEARCH OF HUMAN ANCESTORS

TOPIC: HOW WE STUDY OUR PAST: Stories Told By Fossils

PROBLEM: How do we find out about the human past? What do we look for when trying to find out about the human past?

BACKGROUND:

We know about our recent past because people have kept written records . We can read about an event, view a video, or even interview someone about it. This becomes HISTORY.

However, PRE-HISTORY means no written records. So if we go back in time–beyond written records– we then have to depend on the remains of living things, plant or animal, from past ages. These are FOSSILS.

By studying fossils, scientists can figure out the kinds of animals & plants that lived a long time ago, but are not around today. And from this kind of study we can determine which animals were the ancestors of the ones we see living today.

When we speak of HOMINIDS, we mean the living members of the human family as well as the fossil members.

OBJECTIVES:

1. Construct one's family tree as an example of an historical record.
2. Observe the geographical distribution of one's ancestors.
3. Construct a "Hominid Tree" as an example of a pre-historical record.
4. Examine fossil artifacts as examples of Pre-history.
5. Discover how living things become fossilized

MATERIALS YOU WILL NEED:

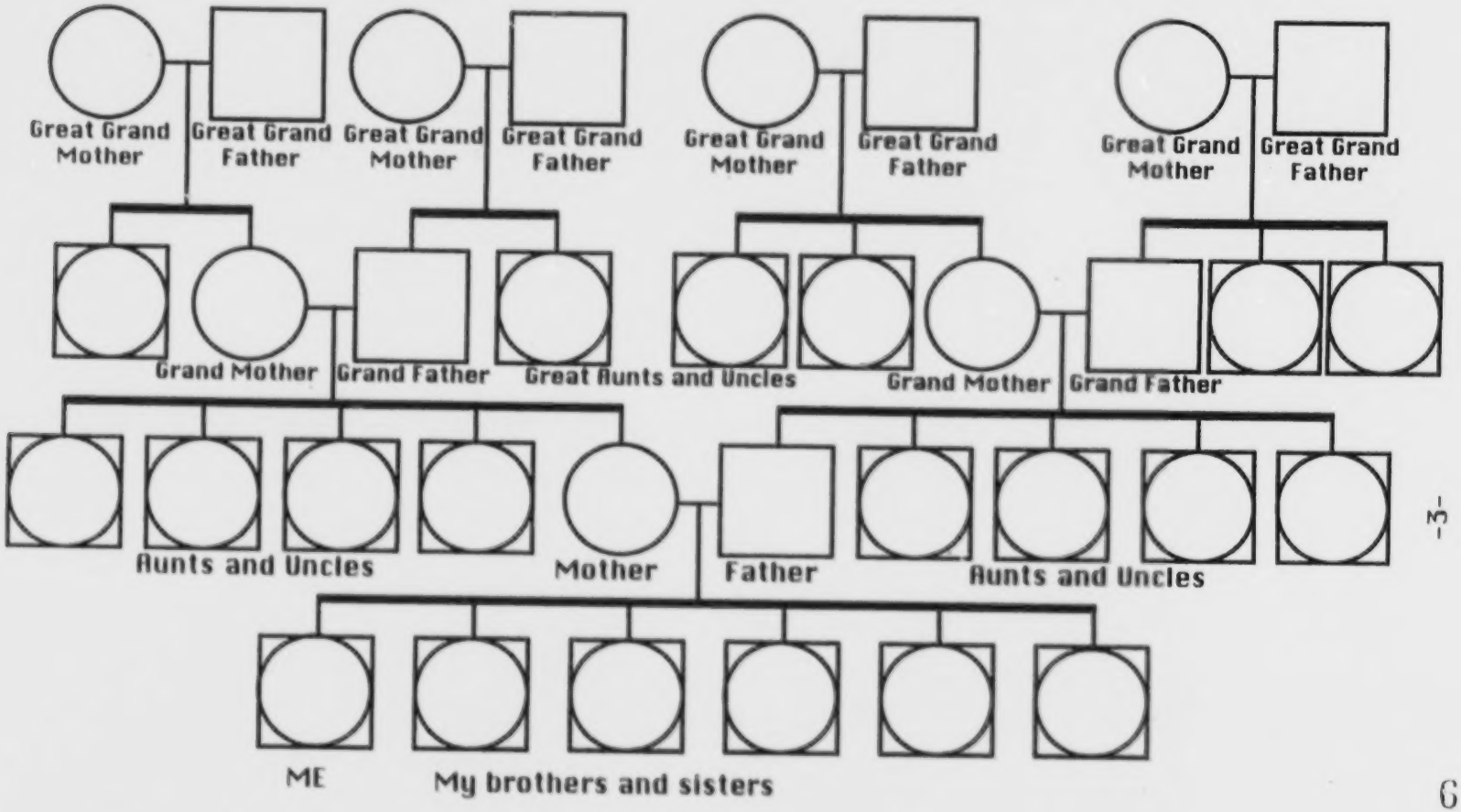
1. Outline chart for filling in your Family Tree
2. World Map
3. Cut-outs for Hominid Tree
4. Outline of Hominid Tree to insert cut-outs
5. Acheulian tools.
6. Booklet, "Stories Told By Fossils"
7. colored pencils or pens
8. scissors
9. glue or scotch tape

PROCEDURES & OBSERVATIONS:

PART 1. MY FAMILY TREE– An Historical Record.

1. With the help of your parents, begin filling in your family tree chart.
   First, fill in your ancestors (parents, grandparents, great-grandparents). Then your relatives (aunts, uncles and cousins)
2. Place an (A) before each ancestor; an (R) before each relative.
3. Under each parent & ancestor's name, write in their country of birth.
4. Color in, on the world map on page 4, the countries of your ancestors. [Not your uncles, aunts, etc.]

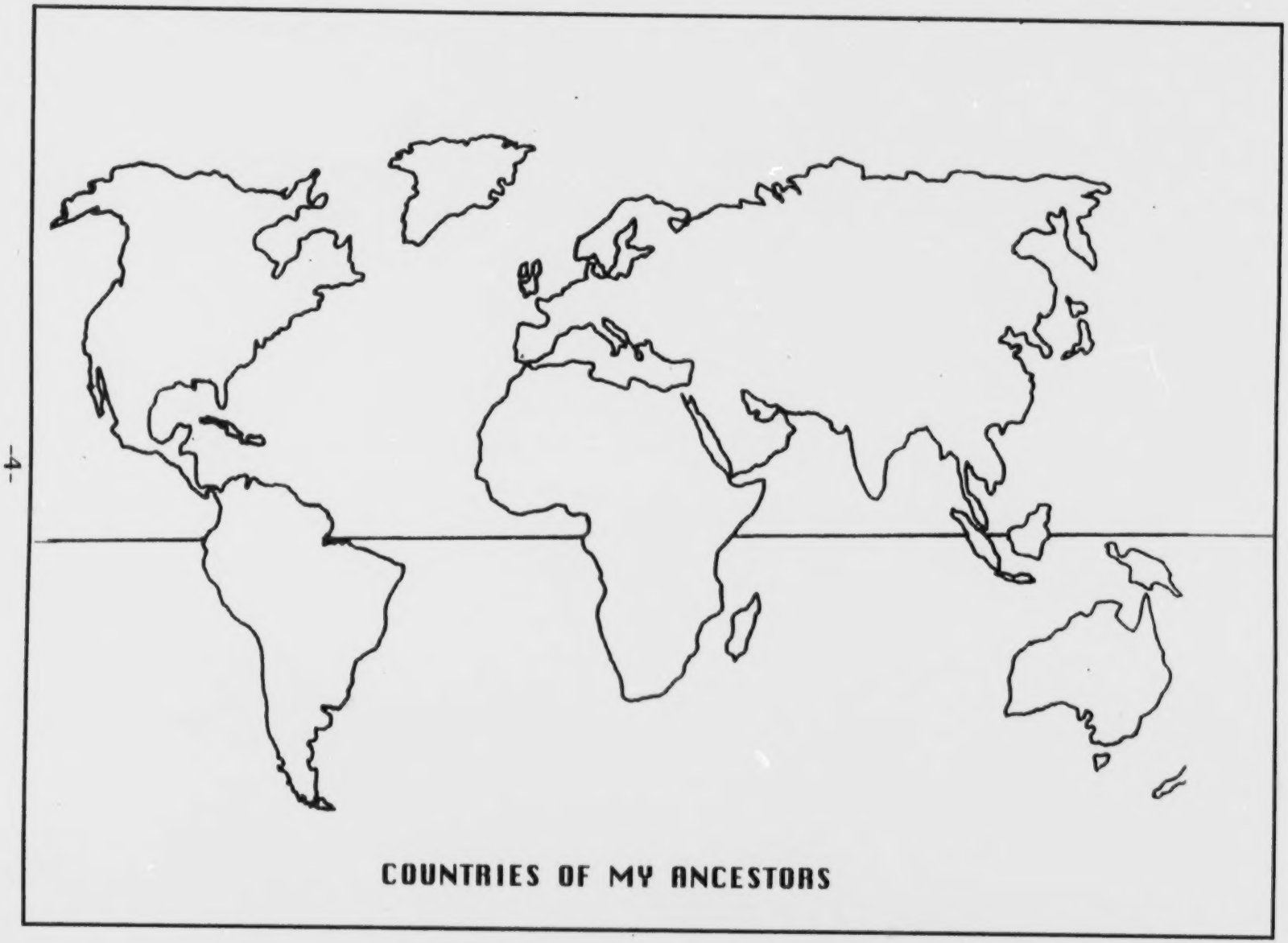
THE FAMILY TREE OF:_____ **DATE:**_____



-3-

5

6

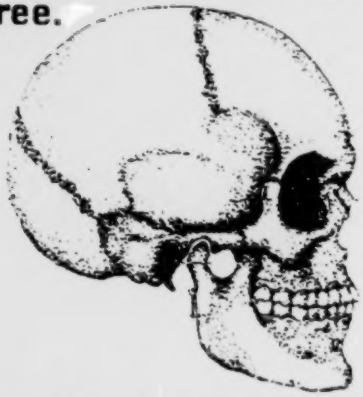


COUNTRIES OF MY ANCESTORS

PART II. THE HOMINID TREE- A Pre-Historical Record

The cut-outs are some of the fossil hominds that have been found as of today.

1. Scotch tape pages 6 and 7 so that your time line starts with the oldest dates at the bottom.
2. Cut out the drawings of the fossil hominids on page 9.
3. Arrange these cut-outs on the Hominid Tree according to their ages.
   (If you have the casts of these fossils in your class, it might be helpful to look at the casts as you place your drawing on the tree.)
4. Glue or scotch tape these figures onto your Hominid Tree.



OBSERVATIONS:

1. How many years did your Family Tree span?

   _____

2. How many years did the Hominid Tree span?

   _____

3. Which hominids do you think changed more, those in the Family Tree or those in the Hominid Tree?

   _____

4. What would you call the hominids you have just put on the tree-ancestors or relatives?

   _____

THE HOMINID "TREE"

TIME	
25,000 B.P.-	*Homo sapiens sapiens*
40,000 B.P.-	Modern *H. sapiens* (Cro-Magnon) appears about 40,000 years ago.
130,000 B.P.-	Neandertal appears about 130,000 years ago.
250,000 B.P.-	Early *H. sapiens* appears about 250,000 years ago.
1.0 M.Y.A.-	*Homo erectus* appears more than 1,000,000 years ago

1.75 M.Y.A.- *Australopithecus robustus*

1.9 M.Y.A.- *Homo habilis* appears about 1.9 million years ago

2.6 M.Y.A.- *Australopithecus africanus* appears about 2.6 million years ago.

3.1-3.5 M.Y.A.- *Australopithecus afarensis* (Lucy) appears about 3.1 - 3.5 million years ago.

15 M. B.P.- *Ramapithecus punjabicus* appears 15 million years ago.

B.P.- Before Present
M.Y.A.- Million years ago

PART III: TOOLS- The Human Hand

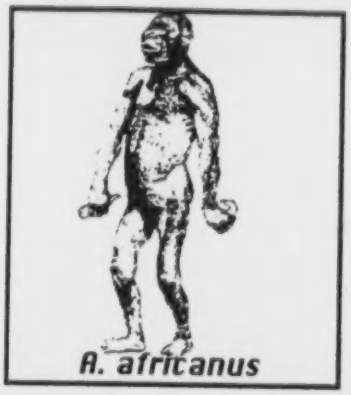
1. Examine the four Acheulian tools distributed by your teacher. These fossils (artifacts) are examples of tools used by our hominid ancestors.
2. Try to figure out how each of these tools may have been used.
3. On the following chart, make a sketch of each tool and write in how each of the tools might have been used.
4. In the last column of the chart, write in how that tool might have changed through time.

ANCIENT TOOLS IN THE HUMAN HAND

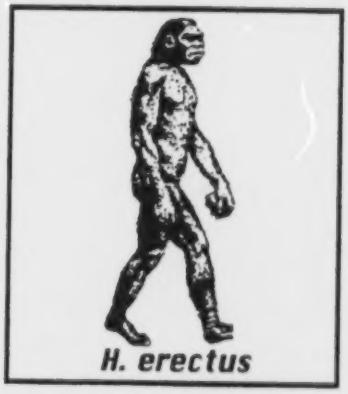
ANCIENT TOOL	SKETCH OF TOOL	USE OF TOOL	EVOLUTION OF TOOL (Type of Tool Today)

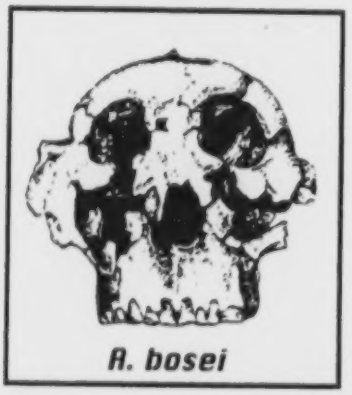
Modern Human

Neandertal


A. africanus

H. habilis


H. erectus


A. bosei

Cro-magnon

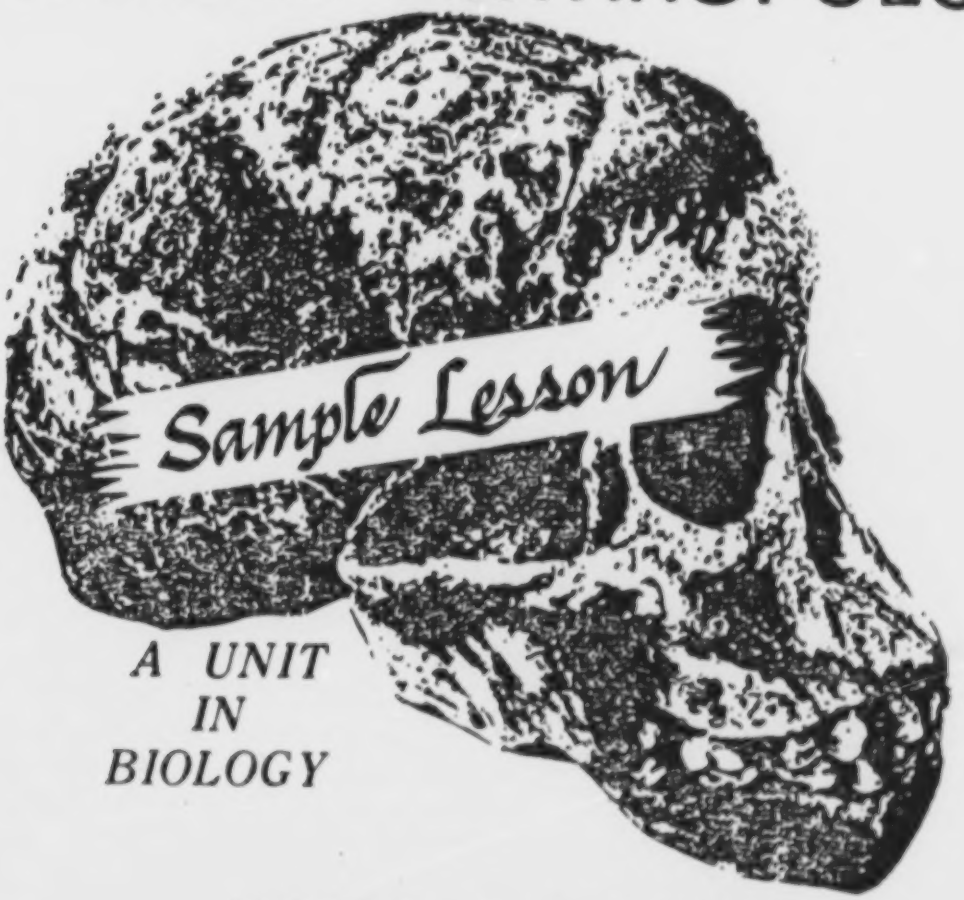
Ramapithecus

"Lucy"

Early *H. sapiens*

EXPLORATION
9

STUDENT LABORATORY EXPLORATIONS IN PHYSICAL ANTHROPOLOGY



A UNIT IN BIOLOGY

HOMO ERECTUS:

HUMANS OF THE PLEISTOCENE

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

LOS ANGELES UNIFIED SCHOOL DISTRICT
INSTRUCTIONAL PLANNING DIVISION
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STUDENT LABORATORY EXPLORATION IN PHYSICAL ANTHROPOLOGY

9
BIOLOGY

NAME_____

PERIOD_____ DATE_____ GROUP_____

TOPIC: HOMO ERECTUS: Humans of the Pleistocene

PROBLEM: Which features of Homo erectus are identifiable as human? Where and how did these hominids live?

BACKGROUND: In the laboratory exploration concerned with Australopithecus you studied some important characteristics of those early fossil hominids. By comparing these and other features of australopithecines with features of apes and later hominids, scientists came to the conclusion that the australopithecines were hominids. The word "human", however, is often reserved to describe members of our own genus, Homo. Although early members of this genus are considered more similar to us and more closely related to us than were the australopithecines, they still differed from modern humans in various ways. Most of the major differences probably relate to the head (skull, teeth, and brain) rather than to other parts of the body. Fossil remains which have been assigned to the genus Homo are now known to approach 2.0 million -- or perhaps even 2.5 million -- years old. Most of the remains of these oldest members of our genus have been discovered within the last 20 years and have not yet been studied in detail by scientists. Some of these specimens have been given the scientific name Homo habilis. They seem in some ways to be intermediate between some australopithecines and later members of the genus Homo. On the other hand, the species Homo erectus has been known since the end of the 19th century and has been carefully studied. The time span during which this species existed is now thought to have been from about 1.5 million years ago to about 300,000 years ago.

OBJECTIVES: After you complete this exploration, you should be able to:

1. Locate sites on a world map where remains of H. erectus have been discovered.

2. Compare major anatomical similarities and differences between australopithecines, members of H. erectus, and modern humans.

3. Measure anatomical features of the skull of members of H. erectus and compare them to those of modern humans.

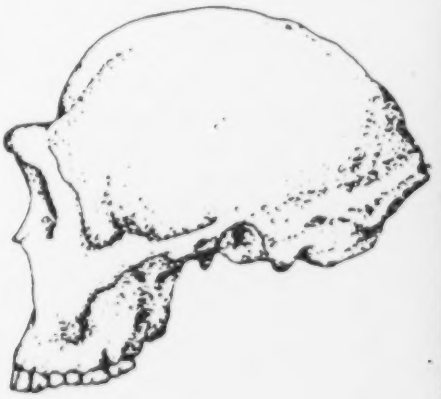
4. Identify behavioral patterns of H. erectus from an archeological site map.

MATERIALS YOU WILL NEED:

Part I. World map from Exploration 8
Colored pencil or pen

Part II. Cast of Choukoutien skull and mandible
Cast of A. africanus skull (Sts 5)
Cast of modern human skull and mandible
Cast of Trinil femur
Modern human femur
Calipers
Metric ruler

Part III. Reference books in your classroom or library



PROCEDURES AND OBSERVATIONS:

PART I. GEOGRAPHICAL DISTRIBUTION OF Homo erectus

The map below shows the locations of some important Homo erectus sites. Using the world map from Exploration 8 and a different colored pencil or pen, plot the sites below on that map. Be sure to add the color you use for H. erectus to your map key.

Other sites, especially archeological ones, are known for the time period during which H. erectus lived. Those shown here, however, represent the approximate total range of distribution of members of this species. On the map below, label the following geographical areas where Homo erectus sites have been found: China; Java; Tanzania; Kenya; Algeria; France; Germany; Spain; Hungary.

Thought: What differences are there between the geographical distributions of Homo erectus and Australopithecus? Can you think of any reasons why this might be?

PART II. COMPARATIVE MORPHOLOGY OF *Homo erectus*

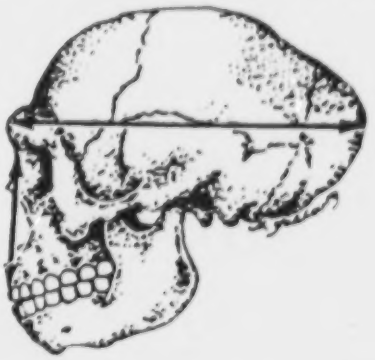
The complete skull of *H. erectus* in your cast set is a reconstruction based on several specimens from Choukoutien. No single *H. erectus* fossil is as complete as this cast. In the table of measurements and ratios on page 5, you may enter any appropriate data that you gathered regarding modern humans or *A. africanus* in previous laboratory explorations. If you have time, however, try taking these measurements again. You probably will not obtain exactly the same results. However, if you measure carefully each time, the results should be approximately the same.

If you do not remember where the points defining the measurements used in this laboratory are located, find their descriptions in Exploration 8. Take all measurements in mm and record results in the table on page 5.

1. Upper facial height/cranial length ratio

   a. Measure the upper facial height and cranial length of the Choukoutien skull.

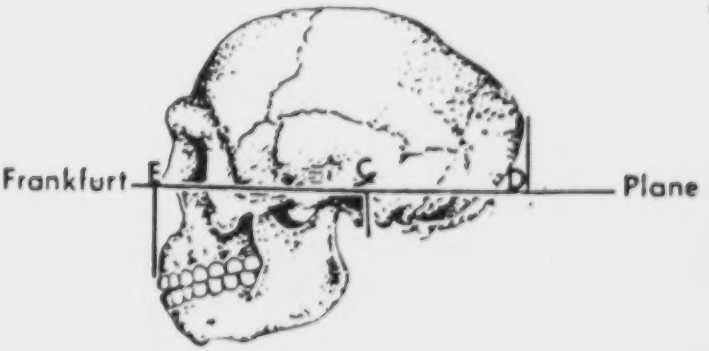
   b. Compute the ratio (upper facial height/cranial length) X 100.



2. Condylar index

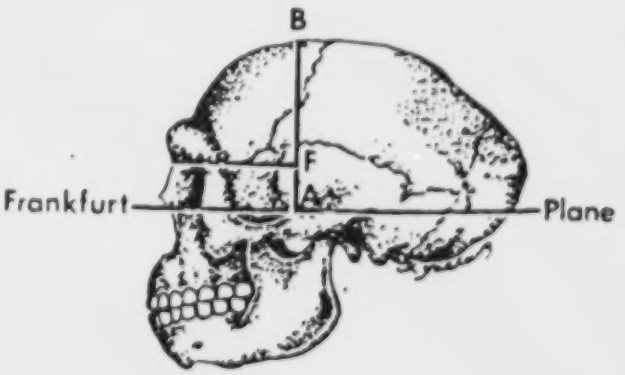
   a. Measure the distances CD and CE on the Choukoutien skull.

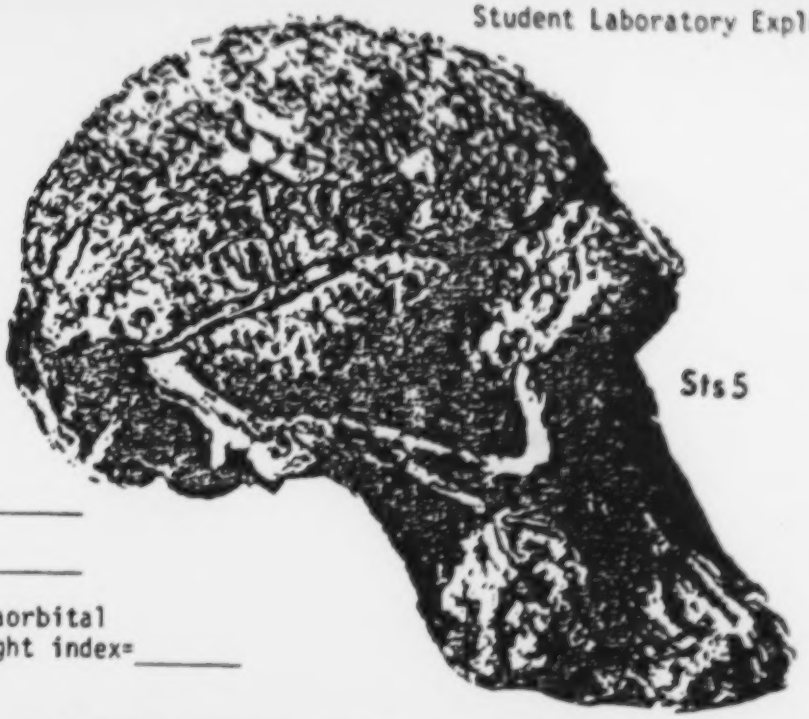
   b. Compute the condylar index: (CD/CE) X 100.



3. Supraorbital height index

   This index is used to measure the height of the skull above the eyes. It indicates how much the skull arches from front to back. First calculate this index for the illustration on page 5. Then measure each of the skulls, compute the index, and record the results in the table. Directions for finding the index are on page 6.





Sts 5

AB=_____

FB=_____

Supraorbital height index=_____

COMPARATIVE SKULL INDICES

FEATURE	A. africanus (Sts 5)	H. erectus (Choukoutien)	H. sapiens (modern)
1. Upper facial height			
Cranial length			
Ratio, facial / cranial length			
2. CD			
CE			
Condylar index			
3. A B			
F B			
Supraorbital height index			
Cranial capacity (range)	400 - 500 cc	775 - 1225 cc	1000 - 2000 cc

a. Draw a line that passes through the bottom of the orbit (eye socket) and through the top of the auditory aperture (ear opening). This line defines the Frankfurt Plane, the plane in which the head is normally carried during life.

b. Draw a perpendicular line from the highest point of the cranium ("B") to the Frankfurt Plane. Label the point where these lines meet "A."

c. Draw a line parallel to the Frankfurt Plane, between the top of the orbit and the vertical line AB. Label the point where these lines meet "F."

d. Measure and record (in mm) the distance AB and the distance FB. Compute and record the supraorbital height index, which equals (FB/AB) X 100.

4. Examine the skull, face, and forehead of the casts of A. africanus, H. erectus, and modern H. sapiens. Record your results in the table below. Relative to one another:

a. Describe the forehead as more vertical or more sloping.

b. Describe the face as larger, more projecting or smaller, straighter.

c. Describe the brow ridges as larger or smaller.

d. Describe the maximum skull width, as seen from the back, as closer to the base, to the top, or in between.

COMPARATIVE SKULL FEATURES

FEATURE	A. africanus (Sts 5)	Homo erectus (Choukoutien)	Homo sapiens (modern)
Forehead			
Face			
Brow Ridges			
Maximum Skull Width			

Thought: How do the indices you have measured differ in the three species compared? How are the numerical differences related to easily visible morphological differences?

5. Femur size

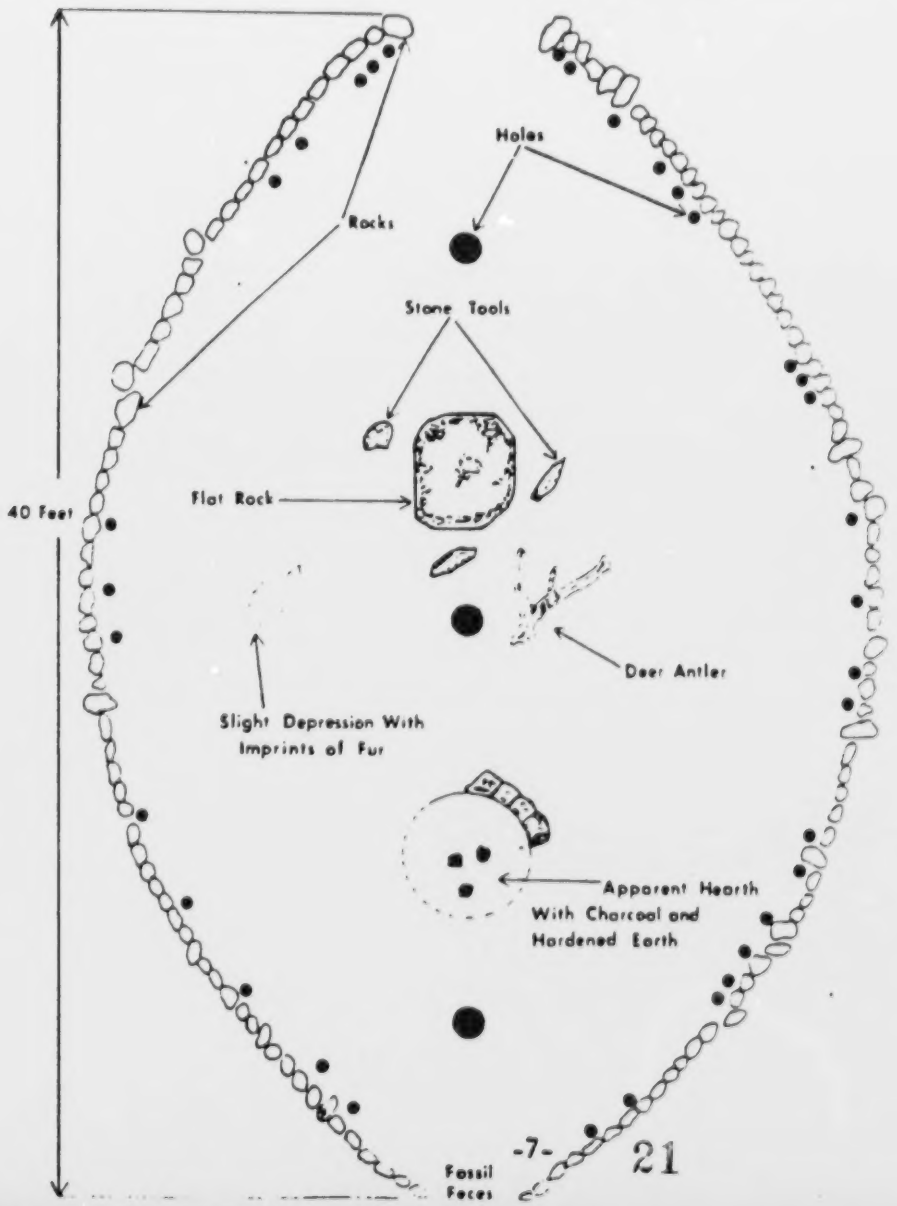
Observe the lengths and diameters of the cast of the femur from Trinil, Java, and of the modern human femur. This Trinil femur may be half a million years old, or older.

Thought: How similar are the Homo erectus and Homo sapiens femora? Would you say that there has been a large change in human height in the last 500,000 years?

Thought: Referring to the first table, on page 5, which developed first in hominids, erect posture and modern body size or modern brain size?

PART III. HOW Homo erectus LIVED

TERRA AMATA SITE (400,000 B.P.)



In 1965, Henry de Lumley, a French archeologist, stopped a building project in Nice, France, when he observed some beach rocks that had been made into tools. A massive excavation project was undertaken. In six months, a 70-foot vertical slice was cut out of the Terra Amata hillside. Numerous levels of deposits suggested different periods of habitation. Artifacts from one level, dating about 400,000 years ago, suggested that a group of humans, apparently Homo erectus, visited this sandy cove near the shoreline. They stayed only briefly, but they left behind some evidence of their visit. On page 7 is a site map showing some of the kinds of evidence found in excavations at Terra Amata.

1. If you were the archeologist who discovered this site, what might you speculate about the habits and daily lives of the hominids who left these remains?

2. Remembering that the site was occupied only temporarily, how would you interpret the fact the fossil feces were found to have very high counts of pollen grains?

3. What evidence is there of uniquely human behavior at this site?

4. What is your guess as to the possible number of individuals who were members of this group?

5. Does the placement of the holes suggest anything to you?

6. Write a short story about this site, explaining how it came into existence. Base your story on the preserved evidence and on reconstructions of Homo erectus in reference books in your classroom or library. What activities and behaviors are revealed in this site?

LOOKING AHEAD:

Homo erectus no longer exists. However, a variety of populations of Homo sapiens have existed in the past and continue to exist today. The next exploration deals with fossil Homo sapiens.

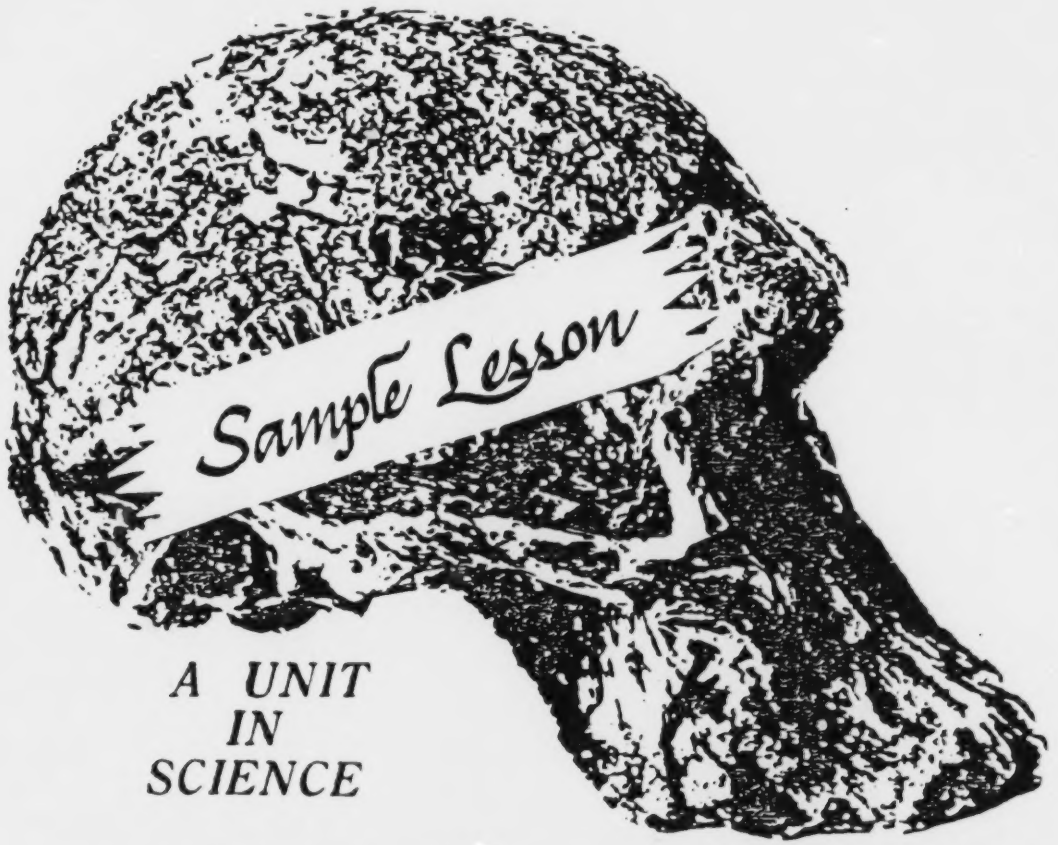
Circle the words hidden in this word search that you have seen and used in this exploration. When you have finished make an alphabetical list of the words that you have found.

T S I G O L O P O R H T N A O E L A P
E R O I V A H E B O O R E U A M Y E R
R O S U T C E R E O M O H A I L M G I
R O M E E E A R R N I A R B L O O D M
A F T T E C E A I A N A M U H E T I A
A G O I N R M T A M I G K M E N A R T
M S I S O A A I H E D S E A A A N W E
A N O O S N P O N G X E D N I L A O S
T I M N E I T U O K U O H C U P S R T
A U S T R A L O P I T H E C U S B B E
T R I N I L O S S I L I B A H O M O H

ALPHABETICAL WORD LIST:

EXPLORATION
10

STUDENT LABORATORY EXPLORATIONS IN PHYSICAL ANTHROPOLOGY



A UNIT IN SCIENCE

PRINCIPLES OF TAXONOMY:

AN INTRODUCTION

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

LOS ANGELES UNIFIED SCHOOL DISTRICT
INSTRUCTIONAL PLANNING DIVISION
1981

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national diffusion network

STUDENT LABORATORY EXPLORATION IN PHYSICAL ANTHROPOLOGY

10 SCIENCE

NAME _____

PERIOD _____ DATE _____ GROUP _____

TOPIC: PRINCIPLES OF TAXONOMY: An Introduction

PROBLEM: How do scientists separate organisms into taxonomic groups?

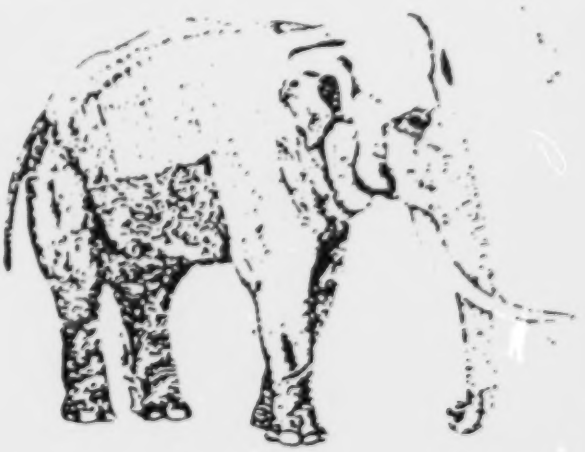
OBJECTIVES: After you complete this exploration, you should be able to:

1. Describe how taxonomists group organisms.
2. Describe the process you would use if you were a taxonomist.

MATERIALS YOU WILL NEED:

Specimens to group and describe
String
Metric ruler

BACKGROUND: Taxonomists are scientists whose main concern is grouping organisms. They try to form groups whose members are related to each other. This exploration will give you the opportunity to do the work of a taxonomist.



PROCEDURES AND OBSERVATIONS:

In this exploration you will work as a taxonomist in describing and grouping imaginary organisms from the planet Cygnus II. This planet was visited by a spaceship and the crew brought back a few samples of the animal life. Your job is to (a) describe the organisms, (b) group the organisms, and (c) provide your reasons for grouping the organisms in this way.

PART I. DESCRIPTIONS

Fill out the table below for each organism. The numbers are only for identification; your numbers may be different from someone else's.

SPECIMEN DESCRIPTIONS

SAMPLE	LENGTH	WIDTH	THICKNESS	DESCRIPTION / SKETCH
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

PART II. GROUPINGS

After taxonomists describe specimens, they try to group them. The specimens which seem most alike should be grouped together. Sometimes there may be several different ways to do this, depending on which characteristics are used. You may use any number of groups and have any number of samples in each group. A group may have only one sample or it may have many. Remember, the lines below are only to help you organize your groups; they are not a clue to the number of samples in each group.

Scientists require a reason for organisms to be grouped together. Opposite each group, give the reason(s) that you put these things together.

Group I. Sample Numbers ____ ____ ____ ____	Group I reason(s): _____ _____ _____
Group II. Sample Numbers ____ ____ ____ ____	Group II reason(s): _____ _____ _____
Group III. Sample Numbers ____ ____ ____ ____	Group III reason(s): _____ _____ _____
Group IV. Sample Numbers ____ ____ ____ ____	Group IV reason(s): _____ _____ _____
Group V. Sample Numbers ____ ____ ____ ____	Group V reason(s): _____ _____ _____

LOOKING AHEAD:

The next exploration introduces the classification system that scientists use for studying animals, including humans.

EXPLORATION
17

STUDENT LABORATORY EXPLORATIONS IN PHYSICAL ANTHROPOLOGY

SEMESTER *COURSE*

NEANDERTALS:
BEGINNINGS OF SPIRITUAL AWARENESS

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

LOS ANGELES UNIFIED SCHOOL DISTRICT
OFFICE OF INSTRUCTION
1982

national diffusion network

STUDENT LABORATORY EXPLORATION IN PHYSICAL ANTHROPOLOGY

17
SEMESTER

NAME_____

PERIOD_____DATE_____GROUP_____

TOPIC: NEANDERTALS: The Beginnings of Spiritual Awareness

PROBLEM: How did Neandertals differ from modern humans? How was their behavior like that of later hominids?

BACKGROUND: The first fossil remains that scientists recognized as being of a truly ancient and "primitive"-looking kind of human were discovered in 1856. This specimen consisted of part of a skull and other bones found in a cave in the Neander Valley of Germany. Therefore, this kind of hominid was named "Neandertal." To scientists in the later part of the 19th century, the first specimens and other remains of Neandertals found later represented a species that looked very primitive and very different from living humans. At the time, remains of older hominids had not yet been discovered. Now that scientists do know about the earlier Homo erectus and australopithecines, however, Neandertals do not seem as different from modern humans as was once thought. In fact, like modern humans, Neandertals are now usually considered members of Homo sapiens.

In this laboratory exploration, the name "Neandertal" is used to refer to peoples living about 100,000 to 40,000 years ago. Some of these groups of people were undoubtedly the ancestors of modern Homo sapiens including ourselves. Other populations, such as those which lived in what is now Western Europe, seem to have been replaced fairly rapidly by modern humans rather than having been their ancestors. The cast that you will use in this exploration is of a Neandertal skull that was found at La Ferrassie, France.

OBJECTIVES: After you have completed this exploration, you should be able to:

1. Locate on a world map major sites where remains of Neandertals have been discovered.

2. Measure and compare physical features of Neandertal and modern Homo sapiens skulls.

3. Interpret evidence of Neandertal behavior.

MATERIALS YOU WILL NEED:

Part I. Your textbook or other reference books in your classroom or library

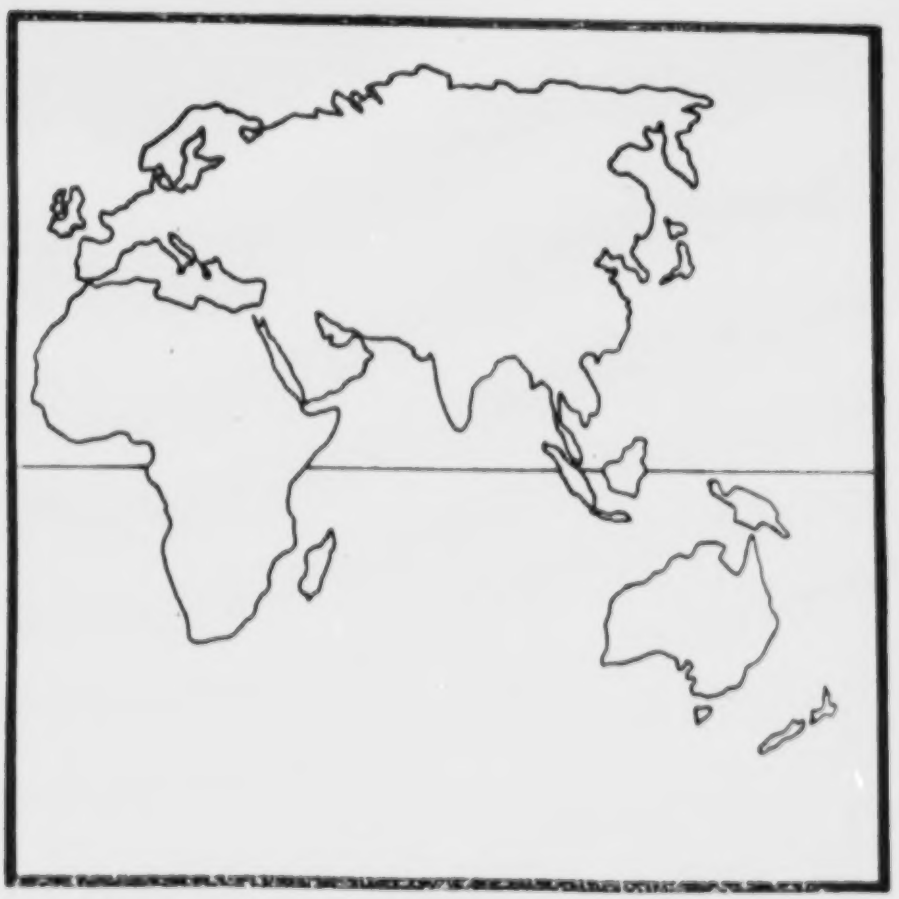
Part II. Cast of La Ferrassie skull and mandible
Cast of modern human skull and mandible
Calipers
Metric ruler

PROCEDURES AND OBSERVATIONS:

PART I. GEOGRAPHIC DISTRIBUTION OF NEANDERTALS

Using your textbook or other reference books, locate the following important sites and mark them on the map below. The sites are ones where remains of Neandertals or other non-modern Homo sapiens have been found.

Neandertal	Le Moustier	Teshik-Tash
Spy	Gibralter	Amud
La Ferrassie	Kiik-Koba	Shanidar
La Chapelle-aux-Saints	Monte Circeo	Broken Hill

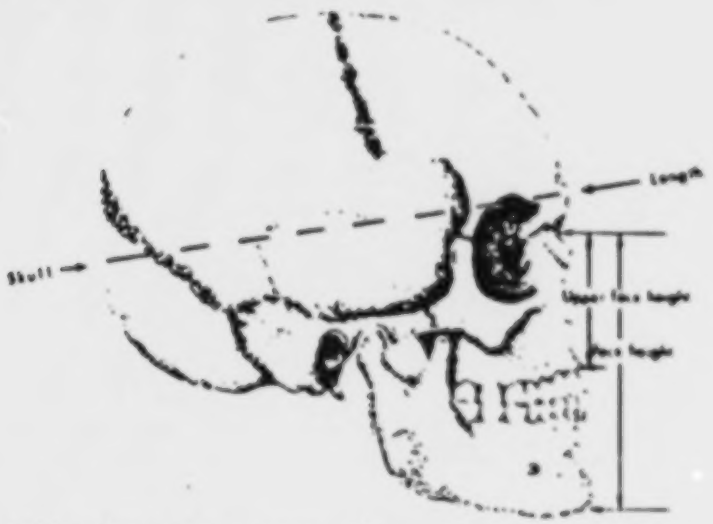


Thought: Why have no Neandertal fossils ever been found in North or South America?

Thought: Can you think of any connection between the locations of Neandertal sites and the climate of the time in which Neandertals lived?

PART II. MORPHOLOGY OF NEANDERTAL SKULLS

In this section, you will compare the skull of a European Neandertal from the site of La Ferrassie with the skull of a modern human. Although these are only single specimens, they do show the major differences between the two populations which they represent.



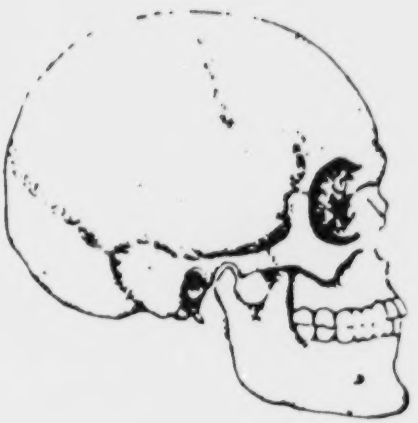
A. Take the following measurements (in mm), calculate the ratios, and record your results in the table which follows. If you do not remember where the anatomical landmarks are located on their skull, find their definitions in Laboratory Exploration 14 or 16.

1. Upper facial height (from nasion to prosthion)
2. Cranial length (from glabella to opisthocranion)
3. Ratio of (upper facial height/cranial length) x 100
4. Cranial breadth (across the parietals)
5. Ratio of (cranial breadth/cranial length) x 100

SKULL MEASUREMENTS

FEATURE	LA FERRASSIE	MODERN HUMAN
1. Upper facial height		
2. Cranial length		
3. Ratio of face/cranial length		
4. Cranial breadth		
5. Ratio of cranial breadth/length		

B. Compare the relative size and/or shape of the following anatomical features for the La Ferrassie and modern human skulls:



SKULL COMPARISONS

FEATURE	LA FERRASSIE	MODERN HUMAN
Forehead height and angle		
Supraorbital ridge		
Orbits		
Nasal opening (somewhat broken in La Ferrassie)		
Cheekbones		
Face, overall		
Mandible		
Chin		
Skull length		
Maximum skull breadth (low, middle, or high on skull)		

Thought: Look at the way in which the teeth of La Ferrassie, especially the anterior teeth, are worn. Compare this condition to the wear of the modern Homo sapiens teeth. What kinds of activities might lead to the kind of wear shown on the teeth of the Neandertal?

Clue: Left orbit (eye socket) damaged and flattened on the outside.

Question: How did this happen? What was the possible result?

_____

_____

_____

Clue: If the left side of the brain was damaged at the same time as the orbit, it might have led to partial paralysis of the right side of the body.

Question: What evidence might indicate there was partial paralysis?

_____

_____

_____

Clues: Right shoulder blade, collar bone, and upper arm all severely withered; right elbow, lower arm, and hand not found with skeleton; lower end of right upper arm bone had a healed fracture and irregular, pathological tip.

Question: Was this condition due to accident? Disease?

_____

_____

_____

Clue: Right foot with marks of a healed fracture and evidence of extensive arthritis; left foot with neither.

Question: How active could this person have been? How might he have contributed to his social group?

_____

_____

_____

Thought: This man seems to have survived quite a while despite his disabilities. What does this suggest about Neandertal society and way of life?

2. INDIVIDUAL: SHANIDAR 3

Clues: A male, probably about 40 years old at time of death; a sharp cut was evident on his left ninth rib.

Question: How was this wound caused?

_____

_____

_____

Clue: The cut had only started to heal at the time of death.

Question: Was the wound related to the death? If so, how?

_____

_____

_____

Thought: Was the injury accidental? If not, what does the wound imply about the life of Neandertals?

3. INDIVIDUAL: SHANIDAR 4

Clues: A male, probably about 40 years old at time of death; buried on his left side in a niche between large rocks, with arms and legs flexed in front of body.

Question: Does this position of the body have significance?

_____

_____

_____

Clue: From soil and other evidence it is clear that this man was buried intentionally.

Question: The oldest intentional burials known are all of Neandertals. What might this mean about their ideas concerning death and other members of their group?

_____

_____

_____

PART III. BEHAVIOR OF NEANDERTALS

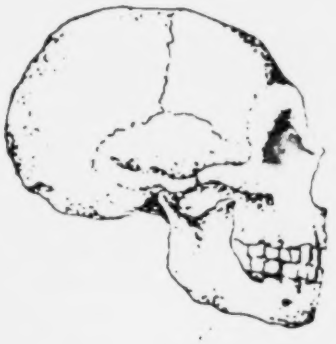
Important evidence of Neandertal behavior was discovered in the site of Shanidar, northern Iraq. Shanidar is a large cave which contains deposits accumulated during much of the last 100,000 years. More than half a dozen complete and partial skeletons of Neandertals and many stone artifacts (classified as Mousterian) have been excavated here. Radiocarbon dates indicate that the Neandertal skeletons range from about 45,000 to 60,000 years old.

On the following pages are some clues to the behavior of these people and their social groups. Most reconstructions of the behavior of hominids who lived in prehistoric times are based on this kind of evidence. Use your imagination and knowledge of human behavior to answer the questions after each clue.

1. INDIVIDUAL: SHANIDAR 1

Clues: A male, probably about 40 years old at time of death; crushed by rocks which fell from cave ceiling; most limb bones strongly built; large, well-marked areas where muscles were attached to bones.

Question: Since Neandertals in general, not just this individual, had strong bones and large muscle attachments, how strenuous do you believe was their way of life?



_____

_____

_____

Clue: Forehead with scars of several small wounds that had healed.

Question: How did these wounds occur?

_____

_____

_____

Clue: In soil samples taken around the skeleton, scientists found many definite clusters of pollen from wildflowers. Elsewhere in the cave, there were no clusters at all.

Question: How did the pollen happen to be associated with the burial, which was located well inside the cave?

_____

_____

_____

Clue: Pollen from at least seven species of brightly colored wildflowers was found in the burial.

Question: How did such a variety of pollen happen to be located in the grave?

_____

_____

_____

Clue: Today, the same species of flowers bloom in this area of Iraq, principally during the month of June.

Question: What does the presence of the pollen suggest concerning the environment and climate of the Shanidar area about 60,000 years ago, when this person died? What time of year did he die?

_____

_____

_____

Thought: Why were flowers placed in the grave? Why do you think some anthropologists have suggested that Neandertals should be considered the first modern humans, despite their physical differences from us?

LOOKING AHEAD:

Apparently Neandertals were somewhat different from living people in anatomy but not very different in behavior. The next exploration deals with some fossil Homo sapiens who were even more similar to living people: Cro-Magnons.

STUDENT EXPLORATIONS

IN SEARCH OF HUMAN ANCESTORS

A STONES & BONES Pathway in Middle School Science

STONES & BONES integrated science unit especially designed for the middle school curriculum. By getting her/his" hands-on" some 15 authentic replica fossil casts, the student will trace the development of the human line over a span of 4 million years.

The laboratory explorations for this pathway is planned to be available to schools for the Spring,1995 semester.

These explorations will follow the STONES & BONES pattern set down in the highly successful secondary pathways.

Sample titles for the labs follow:

TEACHER'S WORKSHOP

IN SEARCH OF HUMAN ANCESTORS

A **STONES & BONES** integrated science unit especially designed for the middle school curriculum.

By getting your **"hands-on" some 15 replica fossil casts**, you will trace the development of the human line over a span of 4 million years

The program is <u>interdisciplinary</u> in design and emphasizes active student participtation by using a series of investigative explorations.
Some of the areas you will explore:

- How We Study Our Past: Stories Told by Fossils
- Measuring Human Differences
- It's About Time
- I Am A Primate; Who Are You?
- GENESIS: Cultural Interpretations of Human Origins
- The Ancestral Lines
- Cro-Magnon: The First Artist
- The Big Dig

This innovative & unique program extends and enriches current science and social science curricula.
The program meets the needs of all ability students.

STONES & BONES is an NDN program and has been cited by the U.S Dept. of Education as a "Proven Exemplary Educational Program" in their publication, **<u>SCIENCE EDUCATION PROGRAMS THAT WORK</u>**.

You can arrange for 1-2 day Teacher-Training Workshops in any or all of the four STONES & Bones pathways in your school or district by:

(1) contacting your National Diffusion Network (NDN) State Facilitator, or

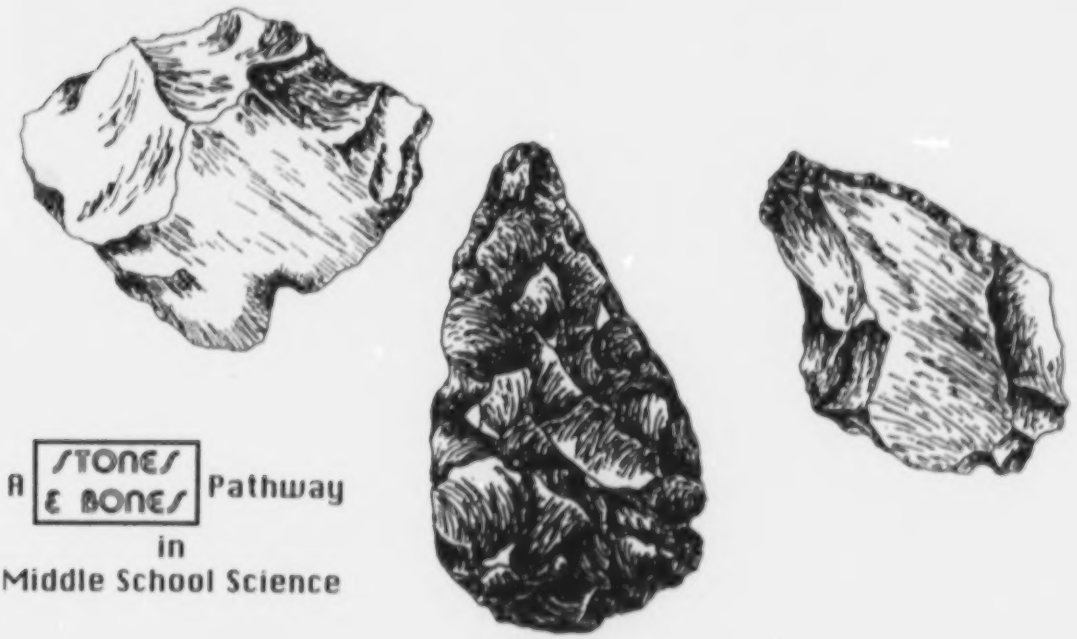
(2) contacting the STONES & BONES Director/Disseminator,

Milton S. Anisman
Physical Anthropology Center
Los Angeles Unified School District
6625 Balboa Blvd.
Van Nuys, CA 91406

(818) 997-2389
(310) 472-6175
(818) 774-9462 FAX

EXPLORATION
1

IN SEARCH OF HUMAN ANCESTORS



A STONES & BONES Pathway
in
Middle School Science

HOW WE STUDY OUR PAST

Stories Told by Fossils

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

ESEA, TITLE IV C
L. A. UNIFIED SCHOOL DISTRICT
L.S.B. LEAKEY FOUNDATION
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OF NATURAL HISTORY

LOS ANGELES UNIFIED SCHOOL DISTRICT
DIVISION OF INSTRUCTION
1994

EXPLORATION
2

IN SEARCH OF HUMAN ANCESTORS

A STONES & BONES Pathway
in
Middle School Science

MEASURING HUMAN DIFFERENCES

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

ESEA TITLE IV-C
L.A. UNIFIED SCHOOL DISTRICT
L.S.B. LEAKEY FOUNDATION
LOS ANGELES COUNTY MUSEUM OF NATURAL HISTORY

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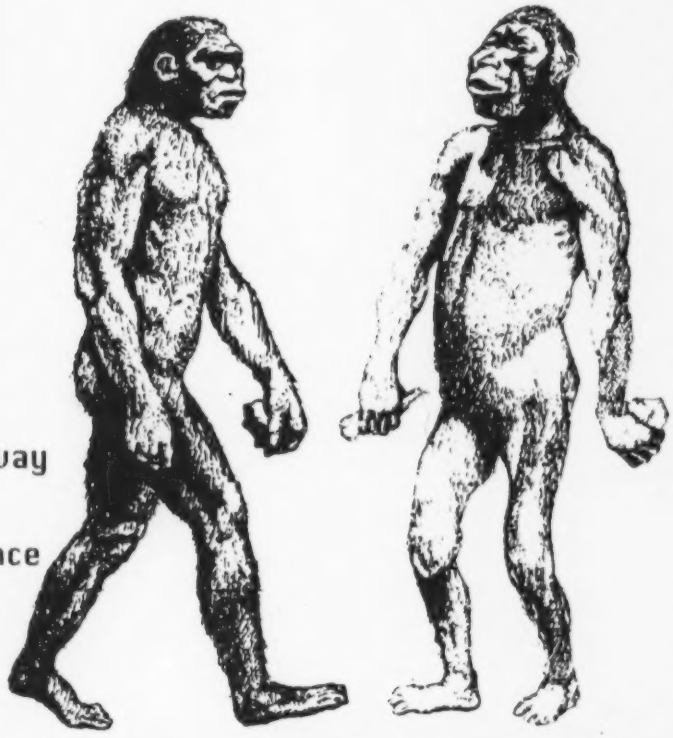
1994

EXPLORATION
3

IN SEARCH OF HUMAN ANCESTORS



A STONES & BONES Pathway
in
Middle School Science

IT'S ABOUT TIME

The Emergence of Life

STONES & BONES
A LABORATORY APPROACH TO PALEO

ESEA TITLE IV C
L. A. UNIFIED SCHOOL DISTRICT
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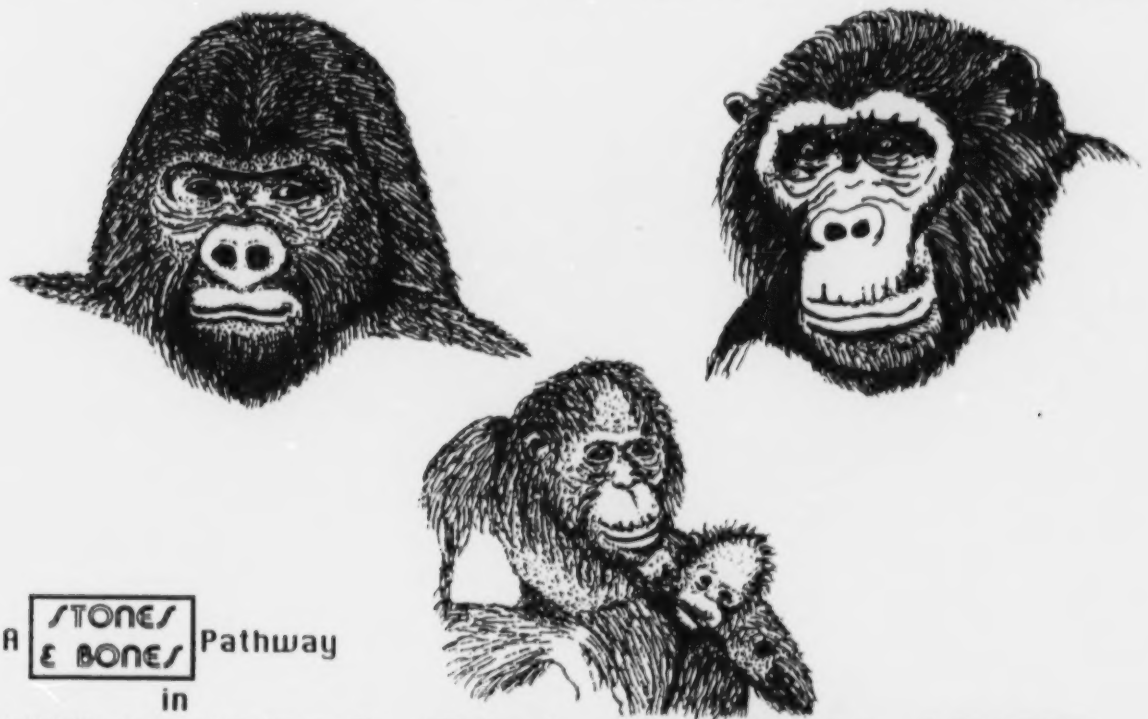
EXPLORATION
4

IN SEARCH OF HUMAN ANCESTORS



A STONES & BONES Pathway
in
Middle School Science

I AM A PRIMATE; WHO ARE YOU?

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

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EXPLORATION
8

IN SEARCH OF HUMAN ANCESTORS

A STONES & BONES Pathway in Middle School Science

EARLY Homo:
The Start of the Human Line

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EXPLORATION
11

IN SEARCH OF HUMAN ANCESTORS

A STONES & BONES Pathway in Middle School Science

CRO-MAGNON: The First Artist

STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

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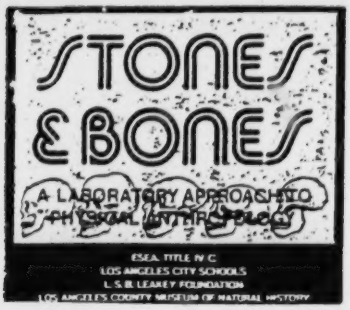

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"STONES AND BONES" - ORDER FORM

nstructional materials for the "STONES AND BONES" program are available at roduction cost. Instructional materials are identified for each of the three nstructional pathways. Please complete this order form and send to the above ddress. ALL PRICES, UNLESS OTHERWISE SPECIFIED, ARE SUBJECT TO CHANGE WITHOUT NOTICE.

GENERAL / LIFE SCIENCE UNIT

Stock No.	Instructional Materials	Suggested Minimum for Ordering*	Quantity Requested	Unit Cost	Extended Cost
100	Student Laboratory Explorations	1 set of 20 investigations		$ 12.50	
101	Student Data Worksheets for Laboratory Explorations	1 set of 20 investigations		$ 10.00	
102	Teacher's Guide for Student Laboratory Explorations	1 Guide		$ 18.00	
103	Student Reading Series, Booklets	1 set, 4 booklets		$ 12.00	
401	Student Laboratory Anthropology Photo-reprints. Actual size**	1 set of 30 photo-reprints		$ 20.00	
402	Terms in Physical Anthropology. Illustrated dictionary**	1 set, 5 per set		$ 25.00	
403	Anthropology Wall Charts**	1 set, 5 charts		$ 25.00	
404	Anthropology Study Prints**	1 set, 15 prints		$ 15.00	
104	Fossil & Modern Replica Casts (refer to pages 10 & 11+)	4 fossil replica casts & artifacts		$560.00	
406-1	Student Laboratory Calipers**	1 set, 5 per set		$ 25.00	
408	Fossil Dig Classroom Kit	1 Kit		$ 40.00	
105	Filmstrip and Cassette	1 set		$ 20.00	
106	Pre- and Post- Tests & Student Survey Form	1 set		$ 5.00	

PAGE 12 TOTAL = $_____

+ For individual cast purchases, use order form, page 15.

* The number identified is a minimum amount for one class. Printed materials may be ordered in larger quantities if duplicating facilities are not available.

**Instructional materials used with two or more instructional pathways.

BIOLOGY UNIT

Stock No.	Instructional Materials	Suggested Minimum for Ordering *	Quantity Requested	Unit Cost	Extended Cost
200	Student Laboratory Explorations	1 set of 11 investigations		$ 12.50	
201	Student Data Worksheets for Laboratory Explorations	1 set of 11 investigations		$ 10.00	
202	Teacher's Guide for Student Laboratory Explorations	1 Guide		$ 18.00	
203	Student Anthropology Syllabus	1 booklet		$ 10.00	
401	Student Laboratory Anthropology Photo-reprints. Actual size**	1 set of 30 photo-reprints		$ 20.00	
402	Terms in Physical Anthropology. Illustrated dictionary**	1 set, 5 per set		$ 25.00	
403	Anthropology Wall Charts**	1 set, 5 Charts		$ 25.00	
404	Anthropology Study Prints**	1 set, 15 prints		$ 15.00	
405	The Hominid Family Album**	1 booklet		$ 6.00	
205	Fossil & Modern Replica Casts (refer to pages 10 & 11 +)	9 fossil replica casts & artifacts		$1105.00	
06-2	Student Laboratory Calipers **	1 set, 10 per set		$ 50.00	
407	Filmstrip and Cassette ** "What is Physical Anthropology?"	1 set		$ 20.00	
206	Pre- and Post- Tests & Student Survey Form	1 set		$ 5.00	

PAGE 13 TOTAL = $_____

+ For individual cast purchases, use order form, page 15.

* The number identified is a minimum amount for one class. Printed materials may be ordered in larger quantities if duplication facilities are not available.

** Instructional materials used with two or more instructional pathways.

ANTHROPOLOGY SEMESTER COURSE

Stock No.	Instructional Materials	Suggested Minimum for Ordering*	Quantity Requested	Unit Cost	Extended Cost
300	Student Laboratory Explorations	1 set of 20 investigations		$ 12.50	
301	Student Data Worksheets for Laboratory Explorations	1 set of 20 investigations		$ 10.00	
302	Teacher's Guide for Student Laboratory Explorations	1 Guide		$ 18.00	
401	Student Laboratory Anthropology Photo-reprints. Actual size**	1 set of 30 photo-reprints		$ 20.00	
402	Terms in Physical Anthropology Illustrated dictionary **	1 set, 5 per set		$ 25.00	
403	Anthropology Wall Charts **	1 set, 5 charts		$ 25.00	
404	Anthropology Study Prints **	1 set, 15 prints		$ 15.00	
405	Hominid Family Album **	1 booklet		$ 6.00	
303	Pre- and Post- Tests & Student Survey Forms	1 set		$ 5.00	
304	Fossil & Modern Replica Casts (refer to pages 10 & 11 +)	14 fossil replica casts & artifacts		$1525.00	
406-3	Student Laboratory Calipers **	1 set, 12 per set		$ 60.00	
407	Filmstrip and Cassette "What is Physical Anthropology?"	1 set		$ 20.00	

PAGE 14 TOTAL = $_____

\+ For individual cast purchases, use order form, page 15

* The number identified is a minimum amount for one class. Printed materials may be ordered in larger quantities if duplication facilities are not available.

** Instructional materials used with two or more instructional pathways.

FOR PURCHASE OF INDIVIDUAL CAST

Use this page of the order form if specific fossil replica casts, other than those listed as a set, are needed.

Refer to pages 10 and 11 for identification number and description.

ID. No.	Deacription	Quantity	Unit Cost	Extended Cost
			PAGE 15 TOTAL = $ _____	

STONES & BONES ORDER FORM (continued)

Middle School Pathway: Page 11a TOTAL =_____
General/Life Science Unit Pathway: PAGE 12 TOTAL =_____
Biology Unit Pathway: PAGE 13 TOTAL =_____
Anthropology Unit Pathway: PAGE 14 TOTAL =_____
Purchase of Individual Cast: PAGE 15 TOTAL =_____
SUBTOTAL =_____
SHIPPING =_____
INSURANCE (for casts) =_____
SALES TAX =_____
TOTAL.....

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City:_____ State_____ Zip code:_____

Schools/Districts other than L.A. Unified School District:

Please make check payable to:
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Program No. 3971

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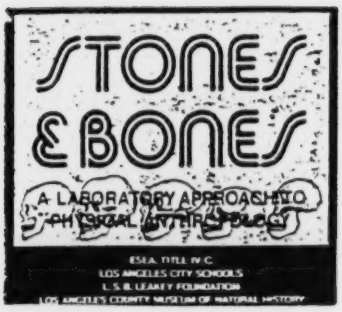
Physical Anthropology Center
6625 Balboa Blvd.
Van Nuys, CA 91406

For assistance, please call the STONES & BONES Project Office:
Milton S. Anisman, Project Director/Disseminator (818)997-2389 or (310) 472-6175; FAX: (818) 774-9462



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--- INSTRUCTIONAL MATERIALS ---

The following information describes the instructional materials produced by the "STONES AND BONES" Anthropology Project. Please note that three major instructional pathways have been developed with commensurate teaching materials: 1. Anthropology Unit for General/Life Science (page 12 of the order form) 2. Anthropology Unit for Biology (page 13 of the order form) 3. Anthropology Semester Course (page 14 of the order form).

GENERAL/LIFE SCIENCE UNIT

Stock No.	Item	Unit	Unit Cost
100	STUDENT LABOPATORY EXPLORATIONS, Laboratory Workbook	Set	$12.50

Twenty investigative-oriented lessons that guide students in the explorations and study of anthropological topics. Simplified format with lowered readability level. Illustrated, highly motivational lessons. Includes interdisciplinary emphasis on the reinforcement of written language, mathematical skills, and geography.

TITLES OF LESSONS

1. *Interpreting the Human Past*
2. *Traveling Through Time*
3. *Geological Time Table*
4. *Measuring Radioactivity*
5. *Determining Half-life*
6. *Interpreting Fossils*
7. *Archeological Dig*
8. *Locating Points on the Map*
9. *Fossil Sites*
10. *Principle of Taxonomy: An Introduction*
11. *Where Humans Belong*
12. *Primates: Who and Where Are They*
13. *Behavior of Primates*
14. *Measuring Human Differences*
15. *Calculating an Index*
16. *Australopithecus*
17. *Homo erectus*
18. *Homo sapiens*
19. *Comparing Fossil Hominids*
20. *Summary and Review*

All prices unless otherwise specified

Stock No.	Item	Unit	Unit Cost
101	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS, Laboratory Worksheets *Laboratory worksheets for each of the investigative-oriented lessons. May be used as masters to produce multiple copies for classroom use.*	Set	$10.00
102	TEACHER'S GUIDE FOR STUDENT LABORATORY EXPLORATIONS, Teacher's Guide for Laboratory Workbook *Twenty investigations plus teacher's information, 340 pages, provides teaching strategies, background information, and suggested student responses for Student Laboratory Explorations.*	Each	$18.00
103	STUDENT READING SERIES ON ANTHROPOLOGICAL TOPICS, Reading Booklets *A series of four student reference booklets emphasizing specific topics in Physical Anthropology. Narrative style, simplified format, lowered readability level, and illustrated.*	Set	$12.00
401	STUDENT LABORATORY ANTHROPOLOGY PRINTS, Picture Set *Thirty photographic reprints (19"x12") of fossil replicas used in the program. These photographs may be used in conjunction with the casts or in lieu of them.*	Set	$20.00
402	TERMS IN PHYSICAL ANTHROPOLOGY, Illustrated Dictionary *Five copies per set. An illustrated dictionary of terms to help students understand and use correctly the language of anthropology. Includes other related fields of science: Biology, Geology, and Physiology. 106 pages.*	Set	$25.00
403	ANTHROPOLOGY WALL CHARTS *Five large illustrated charts used for reference, discussion, and bulletin board display. Chart topics include: Geological Time, The Primate Order, Apes and Humans, Hominoidea; Emergence of Life on Earth, and The Human Family; Hominoidea. Range in size, approximately 19" x 26".*	Set	$25.00
404	ANTHROPOLOGY STUDY PRINTS, Study/Reference Prints *Student reference of 15 study prints that include frontal and lateral views as well as written information regarding names of specimens, age, location found, discoverer, major physical features, geographical range of specimens, and behavioral comments. The study prints are used as a source of data to supplement laboratory and reading materials.*	Set	$15.00

Stock No.	Item	Unit	Unit Cost
104	FOSSIL SPECIMEN REPLICA CASTS, 4 replica casts and 4 artifact stone tools per set	Set	$560.00
	Refer to pages 10 and 11 for cost of individual replica casts and the listing of casts recommended for this unit. Replicas of fossil specimen to be used by students in laboratory explorations. These fossil casts are of actual size, extremely durable, and have been prepared with scientific authenticity. Technical assistance has been received from the L.S.B. Leakey Foundation and the Los Angeles County Museum of Natural History through project's cooperative effort.		
406-1	STUDENT LABORATORY CALIPERS, Caliper-type Instrument	Set	$25.00
	Set of five calipers made of metal to be used to measure fossil casts. Physical features such as facial and cranial lengths are compared using mathematical ratios. Approximately 10½ inches in length, designed to measure exterior and interior dimensions.		
105	FILMSTRIP AND CASSETTE, "WHAT IS ANTHROPOLOGY?"	Set	$20.00
	Sound filmstrip in color that is used in the Science Unit pathway to introduce the students to the study of Physical Anthropology. Filmstrip emphasizes the interdisciplinary nature of Physical Anthropology with subject areas including: Biology, Geology, Chemistry, Physiology, and Cultural Anthropology. Questions are raised for discussions in class and recording of information in the first laboratory exploration.		
408	FOSSIL DIG CLASSROOM KIT, Excavation Simulation Kit	Each	$40.00
	Kit contains materials for embedding artifacts in medium. Sufficient materials supplied for students to work in small groups. Specimens are excavated using tools provided in the kit. Students use techniques that apply to archeological digs. Materials included in the kit are: Plastic bowls, casting plaster, two artifact tools, vermiculite, styrofoam cups, stirrer, 10 excavation tools, disposable mask, and an instructional sheet.		
106	PRE-, POST- TESTS AND STUDENT SURVEY FORMS, Tests	Set	$ 5.00
	Pre- and Post- tests used in conjunction with teaching the Science Unit Pathway. May be used as masters to duplicate sufficient copies for individual student use.		

BIOLOGY UNIT

Stock No.	Item	Unit	Unit Cost
200	STUDENT LABORATORY EXPLORATIONS. Laboratory Workbook	Set	$12.50

Eleven investigative-oriented lessons that guide students in the explorations and study of anthropological topics. Illustrated, highly motivational lessons, and self-directive. Includes interdisciplinary emphasis on the reinforcement of written language, mathematical skills and geography.

TITLES OF LESSONS

1. The Nature of Physical Anthropology: Introduction and Overview
2. Primate Morphology: Human and Ape Skulls and Dentition
3. Primate Locomotion: Apes and Humans
4. Primate Behavior and Distribution
5. Characteristics of Evolution: Patterns of Change
6. Phylogeny Through Time: Vertebrate Adaptations
7. Interpreting the Archeological Record
8. Australopithecus: Ancestral Hominids
9. Homo erectus: Humans of the Pleistocene
10. Homo sapiens: Neandertals and Modern Humans
11. Looking Back: Summary and Review

201	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS. Laboratory Worksheets	Set	$10.00

Laboratory worksheets for each of the investigative-oriented lessons. May be used as masters to produce multiple copies for classroom use.

202	TEACHER'S GUIDE FOR STUDENT LABORATORY EXPLORATIONS. Teacher's Guide for Laboratory Workbook	Each	$18.00

Eleven investigations plus teacher's information, 220 pages, provides teaching strategies, background information, and suggested student responses for Student Laboratory Explorations.

401	STUDENT LABORATORY ANTHROPOLOGY PRINTS, Picture Set	Set	$20.00

Thirty photographic reprints (9"x12") of fossil replicas used in the program. These photographs may be used in conjunction with the casts or in lieu of them.

203	STUDENT ANTHROPOLOGY SYLLABUS, Reading Booklet	Each	$10.00

Student reference reading material. Illustrated copy is used in conjunction with the laboratory explorations. Provides background and summary-type information relative to the study of humankind. 203 pages.

Stock No.	Item	Unit	Unit Cost
402	TERMS IN PHYSICAL ANTHROPOLOGY. Illustrated Dictionary Illustrated dictionary of terms comes in a set of five. Aids students to understand and use correctly the language of anthropology. Includes other related fields of science: Biology, Geology, and Physiology. 106 pages.	Set	$25.00
403	ANTHROPOLOGY WALL CHARTS Five large illustrated charts used for reference, discussion, and bulletin board display. Chart topics include: Geological Time, The Primate Order, Apes & Humans: Hominoidea, The Human Family: Hominoidea, and The Emergence of Life on Earth. Range in size, approximately 19"x26".	Set	$25.00
404	ANTHROPOLOGY STUDY PRINTS. Study/Reference Prints Student reference of 15 study prints that include frontal and lateral views as well as written information regarding names of specimens, age, location found, discoverer, major physical features, geographical range of specimens, and behavioral comments. The study prints are used as a source of data to supplement laboratory and reading materials.	Set	$15.00
405	THE HOMINID FAMILY ALBUM. Reference Guide Provides summary type information relating to fossil specimens used in the Physical Anthropology program including fossil names, species, approximate age, site, discoverer, and other key data.	Each	$ 6.00
406-2	STUDENT LABORATORY CALIPERS. Caliper-type instrument Set of 10 calipers made of metal to be used to measure fossil casts. Physical features such as facial and cranial lengths are compared using mathematical ratios. Approximately 10¼ inches in length, designed to measure exterior and interior dimensions.	Set	$50.00
407	FILMSTRIP AND CASSETTE, "WHAT IS PHYSICAL ANTHROPOLOGY?" Sound, Color Filmstrip Sound filmstrip in color that is used in Biology and Semester Pathways to introduce the students to the study of Physical Anthropology. Filmstrip emphasizes the interdisciplinary nature of Physical Anthropology with subject areas including: Biology, Geology, Chemistry, Physiology, and Cultural Anthropology. Questions are raised for discussions in class and recording of information in the first laboratory exploration.	Set	$20.00

Biology Unit (continued)

Stock No.	Item	Unit	Unit Cost
205	FOSSIL SPECIMEN REPLICA CASTS, 9 replica casts and 4 artifact stone tools per set	Set	$1105.00
	Refer to pages 10 and 11 for cost of individual replica casts and the listing of casts recommended for this unit. Replicas of fossil specimen to be used by students in laboratory explorations. These fossil casts are of actual size, extremely durable, and have been prepared with scientific authenticity. Technical assistance has been received from the L.S.B. Leakey Foundation and the Los Angeles County Museum of Natural History through project's cooperative effort.		
206	PRE-, POST- TESTS AND STUDENT SURVEY FORMS, Tests	Set	$ 5.00
	Pre- and Post- tests used in conjunction with teaching the Biology Unit Pathway. May be used as masters to duplicate sufficient copies for individual student use.		

ANTHROPOLOGY SEMESTER COURSE

Stock No.	Item	Unit	Unit Cost
300	STUDENT LABORATORY EXPLORATIONS, Laboratory Workbook	Set	$12.50

Twenty investigative-oriented lessons that guide students in the exploration and study of anthropological topics. In-depth approach that reinforces and extends student's prior experiences in either Science or Biology Units. Illustrated, highly motivational lessons. Includes interdisciplinary emphasis on the reinforcement of written language, mathematical skills, and geography.

TITLES OF LESSONS

1. The Scope of Anthropology: Introduction and Overview
2. Anthropometry: Measuring Human Beings
3. Fingerprints in Humans: An Aspect of Variation
4. Molecular Evolution
5. Characteristics of Evolution: Patterns of Change
6. Determining the Half-Life: Radioactivity
7. Continental Drift
8. Phylogeny Through Time: Vertebrate Adaptation
9. Primates: Classification and Morphology
10. Locomotion in Primates: Anthropoids and Prosimians
11. Locomotion in Primates: Pongids and Hominids
12. Comparing Primate Behavior
13. Hominid Origin
14. Australopithecus: Plio-Pleistocene Hominids
15. Interpreting the Archeological Record
16. Homo erectus: A New Way of Life
17. Neandertals: The Beginning of Spiritual Awareness
18. Cro-Magnon: Dawn of Modern Humans
19. Unknown Fossil
20. The Human Past: Summary and Review

301	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS, Laboratory Worksheet	Set	$10.00

Laboratory worksheets for each of the investigative-oriented lessons. May be used as masters to produce multiple copies for classroom use.

302	TEACHER'S GUIDE FOR STUDENT LABORATORY EXPLORATIONS, Teacher's Guide for Laboratory Workbook	Each	$18.00

Twenty investigations plus teacher's information, provides teaching strategies, background information, and suggested student responses for student laboratory explorations.

Stock No.	Item	Unit	Unit Cost
401	STUDENT LABORATORY ANTHROPOLOGY PRINTS, Picture Set *Thirty photographic reprints (9"x12") of fossil replicas used in the program. These photographs may be used in conjunction with the casts or in lieu of them.*	Set	$20.00
402	TERMS IN PHYSICAL ANTHROPOLOGY, Illustrated Dictionary *Illustrated dictionary of terms comes in a set of five. Aids students to understand and use correctly the language of anthropology. Includes other related fields of science: Biology, Geology, and Physiology. 106 pages.*	Set	$25.00
403	ANTHROPOLOGY WALL CHARTS *Five large illustrated charts used for reference, discussion, and bulletin board display. Chart topics include: Geological Time, The Primate Order, Apes and Humans: Hominoidea, The Human Family: Hominoidea, and The Emergence of Life on Earth. Range in size, approximately 19"x26".*	Set	$25.00
404	ANTHROPOLOGY STUDY PRINTS, Study/Reference Prints *Student reference of 15 study prints that include frontal and lateral views as well as written information regarding names of specimens, age, location found, discoverer, major physical features, geographical range of specimens, and behavioral comments. The study prints are used as a source of data to supplement laboratory and reading materials.*	Set	$15.00
405	THE HOMINID FAMILY ALBUM, Reference Guide *Provides summary type information relating to fossil specimens used in the Physical Anthropology program including fossil names, species, approximate age, site, discoverer, and other key data.*	Each	$ 6.00
406-3	STUDENT LABORATORY CALIPERS, Caliper-type Instrument *Set of 12 calipers made of metal to be used to measure fossil casts. Physical features such as facial and cranial lengths are compared using mathematical ratios. Approximately 10¼ inches in length, designed to measure exterior and interior dimensions.*	Set	$60.00
303	PRE- AND POST- TESTS AND STUDENT SURVEY FORM, Test *Pre- and Post- tests used in conjunction with teaching the Anthropology Semester Course Pathway. May be used as masters to duplicate sufficient copies for individual student use.*	Set	$ 5.00

thropology Semester Course (continued)

Stock No.	Item	Unit	Unit Cost
304	FOSSIL SPECIMEN REPLICA CASTS. 14 replica casts and 4 artifact stone tools per set	Set	$1525.00

Refer to pages 10 and 11 for cost of individual replica casts and the listing of casts recommended for this Semester Course Pathway. Replicas of fossil specimen to be used by students in laboratory explorations. These fossil casts are of actual size, extremely durable and have been prepared with scientific authenticity. Technical assistance has been received from the L.S.B. Leakey Foundation and the Los Angeles County Museum of Natural History through project's cooperative effort.

407	FILMSTRIP AND CASSETTE. "WHAT IS PHYSICAL ANTHROPOLOGY?"	Set	$ 20.00

Sound filmstrip in color that is used in Biology and Semester Pathways to introduce the students to the study of Physical Anthropology. Filmstrip emphasizes the interdisciplinary nature of Physical Anthrolopology with subject areas including Biology, Chemistry, Physiology, and Cultural Anthropology. Questions raised for discussions in class and recording of information in the first laboratory exploration.

Replica Casts Produced by the "Stones and Bones" Project and Their Application to Instructional Pathways

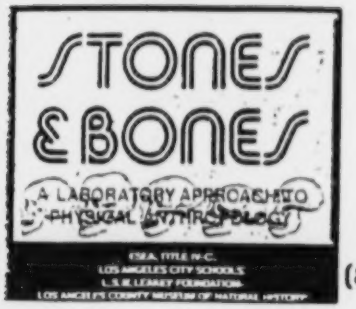
Cat. No.	Description	Instructional Usage: Science Unit	Biology Unit	Semester Unit	Unit Cost
1	RECENT CHIMPANZEE SKULL AND MANDIBLE. Used for comparative anatomy study purposes.	X	X	X	$125.00
2	RECENT GORILLA SKULL AND MANDIBLE. Used for comparative anatomy study purposes.		X	X	$125.00
3	RECENT HUMAN INNOMINATE. Left half of a pelvis, used in the study of locomotion.		X	X	$ 85.00
4	RECENT CHIMPANZEE INNOMINATE. Left half of a pelvis, used in the study of locomotion.		X	X	$ 85.00
5	SKULL OF Australopithecus africanus. From Sterkfontien, South Africa, about 2.5 million years old.	X	X	X	$125.00
6	SKULL, MANDIBLE, AND ENDOCAST OF Australopithecus africanus. "Taung Baby" from Taung, South Africa. About 2 - 3 million years old.		X	X	$125.00
7	SKULL OF Australopithecus boisei. From Olduvai Gorge, Tanzania. Found by Mary and Louis Leakey. About 1.75 million years old			X	$125.00
8	SKULL AND MANDIBLE OF Homo erectus. "Peking Man" from Choukoutien, China. About 300,000 - 500,000 years old	X	X	X	$125.00
9	SKULL AND MANDIBLE OF Early Homo sapiens. "Neandertal" from La Ferrassie, France. About 40,000 - 60,000 years old.	X	X	X	$125.00
10	SKULL AND MANDIBLE OF Early Modern Homo sapiens. "Cro-Magnon" from Cro-Magnon, France. About 20,000 - 30,000 years old.		X	X	$125.00
11	SKULL AND MANDIBLE OF Early Homo sapiens. Skhūl V from Mt. Carmel, Israel. About 30,000 - 50,000 years old.			X	$125.00

Replica Casts Produced by the "STONES AND BONES" Project and Their Application to Instructional Pathways - - - - - (continued)

	Description	Instructional Usage: Science Unit	Biology Unit	Semester Course	Unit Cost
2	TRINIL FEMUR from Java. About 1 million years old. Used for comparative study purposes.			X	$ 85.
3	CALOTTE OF Homo erectus from Trinil, Java. About 500,000 - 1 million years old.			X	$ 85.
4	MANDIBLE OF Homo erectus. "Mauer Jaw" from Mauer, Germany. About 400,000 - 600,000 years old.			X	$ 85.
5	STONE ARTIFACT TOOLS. A set of four stone artifact tools showing different shapes and usage - chopper, scraper, etc.	X	X	X	$ 60.
6	RECENT HUMAN SKULL AND MANDIBLE. Used for comparative anatomy study. OPTIONAL. Most schools may already have a Human skeleton in the department.	O P T I O N A L			$125.
7	CRANIUM and FACE of Early Homo. KNM-ER 1470 a Homo habilis from Koobi Fora, Kenya. Almost 2 million years old.		X	X	$125.

NOTE: Although specific fossil casts are recommended for each of the instructional units, the fossil casts can be purchased individually.

When ordering individually, please specify which cast you wish to purchase and write in Id. No. and name on the order form provided (page 15).



LOS ANGELES UNIFIED SCHOOL DISTRICT
Division of Instruction

PHYSICAL ANTHROPOLOGY CENTER
6625 Balboa Boulevard
Van Nuys, California 91406
(818) 997-2389 or (310) 472-6175 *FAX* **(818) 774-9462**

national diffusion network

Thank you for your interest in our program "Stones and Bones", A Laboratory Approach to Physical Anthropology.

I am sending you our "Information Packet" so that you will get a better idea as to the format and contents of our exciting program. As an ESEA Title IV-C dissemination model program, we provide direct services to schools and/or districts wishing to implement the entire program or some aspects of it. These services include:

- the opportunity for the "Stones and Bones" Disseminator to visit your school/district and present an overview of the program.
- the opportunity for staff members from your district to visit the "Stones and Bones" school site demonstration center.
- the availability of project representatives for in-service and consultation.
- the opportunity to purchase project developed instructional materials.
- provide assistance in writing an Adoption Application for our unique and exciting program, "Stones and Bones".

I hope you will take advantage of these services that are available to you and your district. Please let us know if we can be of further help.

Thank you once again for your interest in "Stones and Bones". We look forward to hearing from you.

Sincerely,

Milton S. Anisman

Milton S. Anisman
Project Disseminator
(818) 997-2389 or (310) 472-6175 (home)

LOS ANGELES UNIFIED SCHOOL DISTRICT
Division of Instruction
PHYSICAL ANTHROPOLOGY CENTER
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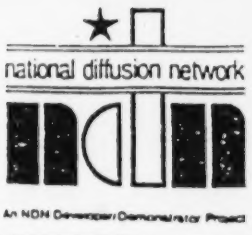

LABORATORY EXPLORATIONS COVERED IN THE THREE SECONDARY PATHWAYS

SCIENCE UNIT

1. Interpreting the Human Past
2. Traveling Through Time
3. Geological Time Table
4. Measuring Radioactivity
5. Determining Half-Life
6. Interpreting Fossils
7. Archeological Dig
8. Locating Points on a Map
9. Fossil Sites
10. Principles of Taxonomy
11. Where Humans Belong
12. Primates: Who &What Are They
13. Behavior of Primates
14. Measuring Human Differences
15. Calculating an Index
16. *Australopithecus*
17. *Homo erectus*
18. *Homo sapiens*
19. Comparing Fossil Hominids
20. Summary and Review

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BIOLOGY UNIT

1. The Nature of Phys. Anthropology
2. Primate Morphology
3. Primate Locomotion: Apes & Humans
4. Primate Behavior & Distrib.
5. Characteristics of Evolution: Patterns of Change
6. Phylogeny Through Time
7. Interpreting Archeological Records
8. Australopithecus:Ancestral Hominids
9. *Homo erectus: Humans of the* Pleistocene
10. *H. sapiens:* Neandertals & Moderns
11. Summary and Review

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SEMESTER COURSE

1. The Scope of Anthropology
2. Anthropometry: Measuring
3. Fingerprints in Humans
4. Molecular Evolution
5. Characteristics of Evolution
6. Determination of Half-Life
7. Continental Drift
8. Phylogeny Through Time
9. Primates: Classification and Morphology
10. Locomotion in Primates: Anthropoids & Prosimians
11. Locomotion in Primates: Pongids & Hominids
12. Comparing Primate Behavior
13. Hominid Origins
14. Australopithecus: Plio-Pleistocene Hominids
15. Interpreting Archeological Records
16. *Homo erectus*::New Way of Life
17. Neandertals: Beginning of Spiritual Awareness
18. Cro-Magnon: Dawn of Modern Man
19. Unknown Fossils
20. The Human Past: Summary,Review

LOS ANGELES UNIFIED SCHOOL DISTRICT
OFFICE OF INSTRUCTION

PHYSICAL ANTHROPOLOGY CENTER
6625 Balboa Boulevard
Van Nuys, California 91406

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national diffusion network
An NDN Developer/Demonstrator Project

List of Laboratory Explorations Covered in

IN SEARCH OF HUMAN ANCESTORS

Exploration 1 HOW WE STUDY OUR PAST: Stories Told by Fossils

Exploration 2 MEASURING HUMAN DIFFERENCES

Exploration 3 IT'S ABOUT TIME

Exploration 4 I AM A PRIMATE; WHO ARE YOU?

Exploration 5 CHANGES THROUGH TIME: Evolution

Exploration 6 GENESIS: Cultural interpretations of Human Origins

Exploration 7 THE ANCESTRAL LINE: *Australopithecus*

Exploration 8 THE ANCESTRAL LINE: Early *Homo*

Exploration 9 THE ANCESTRAL LINE: *Homo erectus*

Exploration 10 THE ANCESTRAL LINE:: *Homo sapiens*

Exploration 11 CRO-MAGNON: The First Artist

Exploration 12 THE BIG DIG: Excavating an Archeological Site

STONES and BONES. A LABORATORY APPROACH TO THE STUDY OF HUMAN ORIGINS

WHY WAS THE PROGRAM DEVELOPED ?

The program was developed to strengthen science textbook programs dealing with the study of past humankind. Science textbooks generally include a chapter on the human past but with no related laboratory problem-solving experiences. The **STONES and BONES** program, with
its interdeisciplinary design and activity-oriented format, enriches & extends the current study of early humankind through laboratory experiences, thus maintaining the continuity of laboratory activities throughout their textbook. The program was also developed to reinforce basic skills in social sciences, mathematics, and language arts

DESCRIPTION OF THE PROGRAM.

STONES and BONES provides activity-oriented, interdisciplinary laboratory investigations for grades 7 through 12, available in three pathways. A Middle School Pathway, entitled, **IN SEARCH OF HUMAN ANCESTORS** is also available for schools structured in grades 6-8. The instructional format is designed to meet the needs of all ability level students; ranging from the unmotivated and non-college oriented students to the highly academic college-oriented students. Each instructional pathway includes the Student Laboratory Explorations (Lab Workwook), Student Data Worksheets, Teacher's Guide, and many other supplementary instructional printed materials. Some 15 accurately replicated casts of fossil specimens provide the "hands-on" experience for the student.

HOW MUCH DOES IT COST TO INSTALL?

The initial cost will vary with the instructional pathway selected for adoption.
The following table summarizes the cost per student based on one class of 30 students.
{In lieu of fossil casts, photographic reprints of fossil replica casts in actual size are used}

Instructional Pathway	Cost per Student-First Year Installation	Cost per Student Subsequent Years
Middle School Unit	$34.17	-0-
Science Unit	$19.00	-0-
Biology Unit	$35.52	-0-
Semester Course	$51.00	-0-

Any number of classes can share the instructional materials if class scheduling is establfished at diferent periods of the day; thus reducing the cost per student.

HOW EFFECTIVE IS THE PROGRAM? HAS ANY DATA BEEN COLLECTED FROM ADOPTION SITES?

Based on collected data involving students from a wide range of ethnic geographical regions and socio-economical levels, student exhibited greater knowledge and understanding of the science concepts taught through the project, regardless of sex or ethnicity. Student opinion reflected the view that the project as both stimulating and motivating. This objective is fundamental to the philosophy of this highly unique and innovative approach to the study of humankind. A reflection of learning motivation provided by the program is indicated from student absenteeism: (1) during project instruction, the absenteeism rate has been 8%, (2) after project instruction absenteeism rate increased to 12%; therefore, students appear to be motivated by the program to attend class.

HOW DO ADOPTERS REACT TO THE "STONES AND BONES" PROJECT?

Areas most cited by adopters are:

* Successful implementation of the project can be accomplished by teachers with little or no background in physical anthropology. The success is primarily attributed to the highly self-directive format of the instructional materials.

* Excellent printed multimedia instructional materials as well as excellent replica casts of fossil specimens.

* Instructional format does not infringe upon the philosophical and/or religious beliefs of students.

* The program reinforces and strengthens the science curriculum. A much needed program for a laboratory approach to the teaching of biology.

* Working with fossil replica casts and other activity oriented explorations results in improved student attendance.

PROJECT ADDRESS: Los Angeles Unified School District
Physical Anthropology Center
6625 Balboa Blvd.
Van Nuys, CA 91406

CONTACT PERSON: Milton S. Anisman
Project Director/Disseminator
(818)997-2389 or (310) 472-6175
FAX: (818)774-9462

CORRELATION OF EXPLORATIONS TO SUBJECT AREAS

M = Major Emphasis
S = Secondary Emphasis

No.	Explorations	Cultural Anthropology	Physical Anthropology: Biology	Chemistry	Physiology & Anatomy	Math	Geography	Geology
1	Interpreting the Human Past	M	M	M	M	M	M	M
2	Traveling Through Time		M			M	M	
3	Geologic Time Table		M			M		M
4	Measuring Radioactivity			M		M		
5	Determing Half-Life			M		M		
6	Interpreting Fossils	S	M	S				M
7	Archeological Dig	M	M		S		S	M
8	Locating Points on a Map						M	
9	Fossil Sites	M	S				M	S
10	Principles of Taxonomy		M		M			
11	Where Humans Belong		M		M			
12	Primates: Who & Where Are They?	S	M		S		M	
13	Behavior of Primates	M	M					
14	Measuring Human Differences		S		M	M		
15	Calculating an Index				M	M		
16	Australopithecus	M	S			M	M	S
17	Homo erectus	M	S			M	M	
18	Homo sapiens	M	S			M	M	
19	Comparing Fossil Hominids		M		M	M		
20	Summary and Review	M	M		M			S
No. of Explorations with Major Emphasis		8	11	3	7	11	8	4
No. of Explorations with Sec. Emphasis		2	5	1	2	0	1	3
% of Explorations with Major Subj. Emphasis		40%	55%	15%	35%	55%	40%	20%
% of Explorations with Sec. Subj. Emphasis		10%	25%	5%	10%	0	5%	15%

CORRELATION OF EXPLORATIONS TO SUBJECT AREAS

M = Major Emphasis
S = Secondary Emphasis

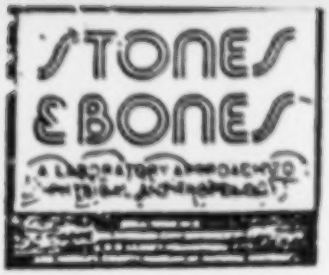
o.	Explorations	Cultural Anthropology	Physical Anthropology					
			Biology	Chemistry	Physiology & Anatomy	Math	Geography	Geology
1	The Nature of Physical Anthropology	M	M	M	M	M	M	M
2	Primate Morphology		M		M	S		
3	Primate Locomotion: Apes & Humans	S	M		M	M		
4	Primate Behavior & Distribution	M	M		M		M	S
5	Characteristics of Evolution: Patterns of Change	M	M		M			
6	Phylogeny Through Time	S	M		M			M
7	Interpreting Archeological Records	M					M	
8	Australopithecus: Ancestral Hominids	M	M		M	M	M	M
9	Homo erectus: Humans of the Pleistocene	M	M			M	M	
0	Homo sapiens: Neandertals and Modern Humans	M	M		M		M	
1	Summary and Review	M	M	M	M	M	M	M
lo. of Explorations with Major Emphasis		8	10	2	9	5	7	4
lo. of Explorations with Sec. Emphasis		2	0	0	0	1	0	1
: of Explorations with Major Subj. Emphasis		72.7%	90%	18.2%	81.8%	45.5%	63.6%	36.4%
		18.2%	0	0	0	9.1%		9.1%

M = Major Emphasis
S = Secondary Emphasis

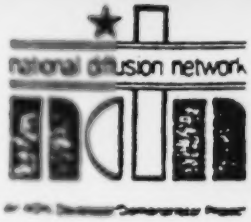
CORRELATION OF EXPLORATIONS TO SUBJECT AREAS

SEMESTER COURSE

No.	Explorations	Cultural Anthropology	Physical Anthropology: Biology	Chemistry	Physiology & Anatomy	Math	Geography	Geology
1	The Scope of Anthropology	M	M	M	M	M	M	M
2	Anthropometry: Measuring Humans				M	M		
3	Fingerprints in Humans		M		M			
4	Molecular Evolution		M	M		S		
5	Characteristics of Evolution	M	M		M			
6	Determination of Half-Life			M		M		
7	Continental Drift						M	M
8	Phylogeny Through Time		M		M			M
9	Primates: Class. & Morphology		M		M	M	M	
10	Locomotion in Primates: Anthropoids & Prosimians		M		M	M		
11	Locomotion in Primates: Pongids & Hominids		M		M	M		
12	Comparing Primate Behavior	M	M					
13	Hominid Origins	M	M		M		S	
14	Australopithecus: Plio-Pleistocene Hominids		M		M	M	M	S
15	Interpreting Archeological Records	M	S		S		M	M
16	Homo erectus: New Way of Life	M	S		M	M	M	
17	Neandertals: Beginning of Spiritual Awareness	M	S		M	M	M	
18	Cro-Magnon: Dawn of Mod. Humans	M	S		M	M	M	
19	Unknown Fossils		M		M	M		S
20	The Human Past: Summary & Review	M	M	S	M	S		S
	No. of Explorations with Major Emphasis	9	13	3	15	11	8	4
	No. of Explorations with Sec. Emphasis	0	4	1	1	2	1	3
	% of Explorations with Major Subj. Emphasis	45%	62.8%	15%	75%	55%	40%	20%
	% of Explorations with Sec. Subj. Emphasis	73 0	20%	5%	5%	10%	74 5%	15%



BASIC RECOMMENDED INSTRUCTIONAL MATERIALS
AND FUNDS NEEDED FOR IMPLEMENTATION



SCIENCE UNIT PATHWAY

Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
100	STUDENT LABORATORY EXPLORATIONS, Laboratory Workbook *Twenty investigative-oriented lessons that guide students in the exploration and study of anthropological topics. May be used as a master to duplicate sufficient copies for individual student use.*	$ 12.50	-0-
101	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS *Laboratory worksheets for each of the investigative-oriented lessons. May be used as master to produce multiple copies for classroom use.*	$ 10.00	-0-
102	TEACHER'S GUIDE FOR STUDENT LABORATORY EXPLORATIONS *Duplicate copy of Student Laboratory Explorations (Stock #100) with typed in student responses, teaching strategies, and additional teacher background information (340 pages)*	$ 18.00	-0-
401	STUDENT LABORATORY ANTHROPOLOGY PRINTS *Thirty photographic reprints (9"x12") of fossil replicas used in the program. These photographs may be used in conjunction with the casts or in lieu of them.*	$ 20.00	-0-
406-1	STUDENT LABORATORY CALIPERS *Set of five calipers made of metal to be used to measure fossil casts. Physical features such as facial and cranial lengths are compared using mathematical ratios. Approximately 10½ inches in length, designed to measure exterior and interior dimensions.*	$ 25.00	-0-
106	PRE-TEST, POST-TEST, AND STUDENT SURVEY FORMS *Pre- and Post- tests used in conjunction with teaching the Science Unit Pathway. May be used as a master to duplicate sufficient copies for individual student use.*	$. 5.00	-0-

All prices unless otherwise specified are subject to change without notice.

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Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
104	FOSSIL SPECIMEN REPLICA CASTS	$ 460.00*	-0-
	Four fossil replica casts and a set of four artifact stone tools made of durable epoxy, stained, excellent quality replicas of originals. The set includes: • *Recent Chimpanzee Skull and Mandible (Used for comparative anatomy study purposes)* • *Skull of Australopithecus africanus (From Sterkfontien, South Africa, about 2.5 million years old)* • *Skull and Mandible of Homo erectus (From Choukoutien, China, between 300,000 - 500,000 years old)* • *Skull and Mandible of Early Homo sapiens. (A Neandertal from La Ferrassie, France, between 40,000 - 60,000 years old)* • *Artifact Stone Tools (A set of four stone artifacts showing different stone tool shapes and usage -- chopper, scraper, etc.)* *All of the above replica casts are also used in the Biology Unit and Anthropology Semester Course pathways.*		
105	FILMSTRIP AND CASSETTE, "What is Anthropology?" *Sound filmstrip used in the Science Unit pathway to introduce students to the study of Physical Anthropology. Filmstrip emphasizes the interdisciplinary nature of Physical Anthropology.*	$ 20.00	-0-
	TOTAL BASIC COST FOR IMPLEMENTATION OF SCIENCE UNIT PATHWAY:	$ 570.50	-0-

The cost of the Science Unit Pathway on a per student basis varies according to the number of classes involved. Any number of classes can share the above materials if class scheduling is established at different periods or days. An example of student cost is as follows (refer to table on next page). However, should your funding be extremely limited, it is possible to teach the Science Unit without purchasing fossil replica casts or calipers. By doing this, using the Student Laboratory Anthropology Prints in lieu of casts, the total expenditure for implementing the Science Unit Pathway is $110.50

*The cost of a cast is $100.00 each when bought as part of a complete Pathway. When bought individually, the cost is $125.00 each.

Number of Classes	Number of Students	Cost of Program Per Student First Year Installation		Cost of Program Per Student Subsequent Years Installation
		With Fossil Casts $570.50	Without Fossil Casts $110.50	
1	30	$ 19.00	$ 3.68	-0-
2	60	$ 9.50	$ 1.84	-0-
3	90	$ 6.34	$ 1.28	-0-
4	120	$ 4.75	$ .92	-0-
5	150	$ 3.80	$ .74	-0-

A NOTE ABOUT SHARING FOSSIL REPLICA CASTS BETWEEN SEVERAL PATHWAYS:

If you are already implementing the Biology Unit Pathway or are considering a Biology Unit Pathway introduction at the same time, the cost of instructional materials for the Science Unit Pathway will decrease the $570.50 amount identified above to $245.50 (since there are three duplicate fossil casts ($300.00) and duplicate calipers ($25.00) used in both programs). The revised $245.50 cost for one classroom of 30 students is $8.18 per student.

For a complete listing of all available instructional materials produced by the "STONES AND BONES" Project, please refer to the general order forms.

BASIC RECOMMENDED INSTRUCTIONAL MATERIALS
and Funds Needed for Implementation

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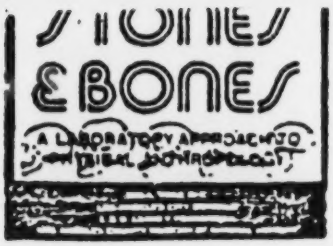
MIDDLE SCHOOL PATHWAY

Stock No	Item	Cost of First year Installation	Cost of Subsequent Years
400	STUDENT LABORATORY EXPLORATIONS A set of 12 investigative-oriented lessons in the exploration & study of Human Origins.	$18.00	-0-
401-1	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS Laboratory worksheets for students to record their data for each of the 12 lessons.	$12.00	-0-
402-1	TEACHER'S GUIDE FOR LAB. EXPLORATIONS Duplicate copy of Student Lab. Explorations (Stock #400) with student responses, teaching strategies, & additional teacher background information	$18.00	-0-
103	STUDENT READING SERIES, Booklets Set of 4 reading booklets, written in brief, narrative form, dealing with the discoveries of "famous" fossils.	$12.00	-0-
203	STUDENT SYLLABUS-booklet Designed as background material for laboratory explorations	$10.00	-0-
406-2	STUDENT LABORATORY CALIPERS Set of 5 calipers made of metal to be used to measure casts	$25.00	-0-
408	FOSSIL DIG CLASSROOM KIT Materials to simulate an archeological dig.	$40.00	-0-

Stock No.	Item	Cost of First year Installation	Cost of Subsequent Years
407	LASCAUX SLIDES Set of 20 slides to accompany lesson on Cro-Magnon.	$20.00	-0-
409	AUDIO TAPE "A Day in the Life of Australopithecus"	$ 5.00	-0-
106	PRE-TEST, POST TEST Used in conjunction with teaching the Middle School Pathway.	$ 5.00	-0-
410	FOSSIL SPECIMEN REPLICA CASTS, a set of 8 replica casts & 4 artifact stone tools. These fossil casts are of actual size, extremely durable, and have been prepared with scientific authenticity. Technical assistance has been furnished by the L.S.B. Leakey Foundation and the L.A. County Museum of Natural History. The set includes: Recent Chimpanzee Skull & Mandible Recent Gorilla Skull & Mandible Skull of *Australopithecus africanus*, STS V Skull, mandible & endocast of *A.africanus*, Taung Cranium, face of Early Homo-*(H.habilis)* KNM ER 1470 Skull & mandible of *Homo erectus*- "Peking Man" Skull & mandible of early *H.sapiens*- 'Neandertal' Skull & mandible of early modern *H.sapiens*- Cro-Magnon Stone artifact tools *Recent Human Skull & mandible (optional)	$860.00	-0- ($100.00) -0-
TOTAL BASIC COST FOR IMPLEMENTATION OF MIDDLE SCHOOL PATHWAY:		$1,025.00	

SUPPLEMENTAL MATERIALS AVAILABLE:

400	ILLUSTRATED DICTIONARY OF TERMS 1 set, 5 per set.	$25.00	-0-
401	STUDENT LABORATORY PHOTO PRINTS Thirty photographic reprints (9"x12") of fossil replicas used in the program.	$20.00	-0-
403	ANTHROPOLOGY WALL CHARTS 1 set, 5 charts; depicting geologic time, emergence of life, hominid tree	$25.00	-0-
404	ANTHROPOLOGY STUDY PRINTS 1 set, 15 prints of fossil replicas used in the program. For classroom display.	$15.00	-0-
405	THE HOMINID FAMILY ALBUM An illustrated, quick reference guide to fossil specimens.	$ 6.00	-0-



BASIC RECOMMENDED INSTRUCTIONAL MATERIALS AND FUNDS NEEDED FOR IMPLEMENTATION

national diffusion network

BIOLOGY UNIT PATHWAY

Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
200	STUDENT LABORATORY EXPLORATIONS, Laboratory Workbook *Eleven investigative-oriented lessons that guide students in the explorations and study of anthropological topics. May be used as a master to duplicate sufficient copies for individual student use.*	$ 12.50	-0-
201	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS *Laboratory worksheets for each of the investigative-oriented lessons. May be used as masters to produce multiple copies for classroom use.*	$ 10.00	-0-
202	TEACHER'S GUIDE FOR STUDENT LABORATORY EXPLORATIONS *Duplicate copy of Student Laboratory Explorations (Stock #200) with typed-in student responses, teaching strategies, and additional teacher background information.*	$ 18.00	-0-
401	STUDENT LABORATORY ANTHROPOLOGY PRINTS *Thirty photographic reprint (9"x12") of fossil replicas used in the program. These photographs may be used in conjunction with the casts or in lieu of them.*	$ 20.00	-0-
406-2	STUDENT LABORATORY CALIPERS *Set of ten double caliper type metal instruments used to measure fossil cast features such as facial and cranial lengths and establishing mathematical ratios. Approximately 10½ inches in length, designed to measure exterior and interior dimensions.*	$ 50.00	-0-
206	PRE-TEST, POST-TEST, AND STUDENT SURVEY FORMS *Pre- and Post- tests used in conjunction with teaching the Biology Unit Pathway. May be used as a master to duplicate sufficient copies for individual student use.*	$ 5.00	-0-

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Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
205	FOSSIL SPECIMEN REPLICA CASTS See page 3 *	$930.00*	-0-
	Nine fossil replica casts and set of four artifact stone tools made of durable epoxy, stained, excellent quality replicas of originals. The set includes: . *Recent Chimpanzee Skull and Mandible** (Used for comparative anatomy study purposes) . *Recent Gorilla Skull and Mandible*** (Used for comparative anatomy study purposes) . *Recent Human Innominate*** (Left half of a pelvis, used in the study of locomotion) . *Recent Chimpanzee Innominate*** (Left half of a pelvis, used in the study of locomotion) . *Skull of Australopithecus africanus** From Sterkfontien, South Africa, about 2.5 million years old.* . *Skull, Mandible, and Endocast of Australopithecus africanus, "Taung Baby" from Taung, South Africa, about 2-3 million years old.*** . *Skull and Mandible of Homo erectus** from Choukoutien, China. Between 300,000 - 500,000 years old.* . *Skull and Mandible of Early Homo sapiens**. A Neandertal from La Ferrassie, France. Between 40,000 - 60,000 years old.* . *Skull and Mandible of Homo sapiens***. A Cro-Magnon from Cro-Magnon, France. About 20,000 - 30,000 years old.* . *Artifact Stone Tools*** A set of four stone artifact tools showing different stone tool shapes and usage - - chopper, scraper, etc.* * *These casts are also used in the Science Unit Pathway.* ** *These casts are also used in the Anthropology Semester Course Pathway.*		
07	FILMSTRIP AND CASSETTE, "WHAT IS PHYSICAL ANTHROPOLOGY?"	$ 20.00	-0-
	Sound filmstrip used in Biology Unit and Anthropology Semester Course Pathways to introduce students to the study of Physical Anthropology. Filmstrip emphasizes the interdisciplinary nature of Physical Anthropology.		
	TOTAL BASIC COST FOR IMPLEMENTATION OF BIOLOGY UNIT PATHWAY:	$1065.50	-0-

The cost of the Biology Unit Pathway on a per student basis varies according to the number of classes involved. Any number of classes can share the instructional materials if class scheduling is established at different periods or days. An example of student cost is as follows (refer to the table below): However, should your funding be extremely limited, it is possible to teach the Biology Unit without purchasing fossil replica casts or calipers. By doing this, using the Student Laboratory Anthropology Prints in lieu of casts, the total expenditure for implementing the Biology Unit Pathway is $135.50

Number of Classes	Number of Students	Cost of Program Per Student First Year Installation		Cost of Program Per Student Subsequent Years Installation
		With Fossil Casts $1065.50	Without Fossil Casts $135.50	
1	30	$ 35.52	$ 4.51	-0-
2	60	$ 17.75	$ 2.26	-0-
3	90	$ 11.84	$ 1.50	-0-
4	120	$ 8.88	$ 1.12	-0-
5	150	$ 7.10	$ .90	-0-

A NOTE ABOUT SHARING FOSSIL REPLICA CASTS BETWEEN SEVERAL PATHWAYS:

If you are already implementing the Science Unit Pathway or are considering a Science Unit Pathway introduction at the same time, the cost of instructional materials for the Biology Unit Pathway will decrease the 1065.50 amount identified above to 580.50 since there are four duplicate fossil replica casts and four artifact stone tools 460.00 and duplicate calipers 25.00 used in both programs. The revised 580.50 cost for one classroom of 30 students is 19.35 per student.

For a complete listing of all available instructional materials produced by the "STONES AND BONES" Project, please refer to the general order forms.

*The cost of a cast is $100.00 each when bought as part of a complete Pathway. When bought individually, the cost is $125.00 each.

BASIC RECOMMENDED INSTRUCTIONAL MATERIALS
AND FUNDS NEEDED FOR IMPLEMENTATION

ANTHROPOLOGY SEMESTER COURSE

Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
300	STUDENT LABORATORY EXPLORATIONS, Laboratory Workbook *Twenty investigative-oriented lessons that guide students in the exploration and study of anthropological topics. Indepth approach that reinforces and extends student's prior experiences in either Science or Biology Unit pathways.*	$ 12.50	-0-
301	STUDENT DATA WORKSHEETS FOR LABORATORY EXPLORATIONS *Laboratory worksheets for each of the investigative-oriented lessons. May be used as masters to produce multiple copies for classroon use.*	$ 10.00	-0-
302	TEACHER'S GUIDE FOR STUDENT LABORATORY EXPLORATIONS *Duplicate copy of Student Laboratory Explorations (Stock No. 300) with typed in student responses, teaching strategies, and additional teacher background information (398 pages).*	$ 18.00	-0-
401	STUDENT LABORATORY ANTHROPOLOGY PRINTS *Thirty photographic reprints (9"x12") of fossil replica casts used in the program. These photographs may be used in conjunction with the casts or in lieu of them.*	$ 20.00	-0-
406-3	STUDENT LABORATORY CALIPERS *Set of twelve double caliper type metal instruments used to measure fossil cast features such as facial and cranial lengths and establishing mathematical ratios. Approximately 10½" in length, designed to measure exterior and interior dimensions.*	$ 60.00	-0-
303	PRE-TEST, POST-TEST, AND STUDENT SURVEY FORMS *Pre- and Post- tests used in conjunction with teaching the Semester Course Pathway. May be used as a master to duplicate sufficient copies for individual student use.*	$ 5.00	-0-

All prices unless otherwise specified are subject to change without notice.

Rev. 7-84

Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
304	FOSSIL SPECIMEN REPLICA CASTS See page 3*	$1,385.00*	-0-

Fourteen fossil replica casts and set of four artifact stone tools made of durable epoxy, stained, excellent quality replicas of originals. The set includes:

. Recent Chimpanzee Skull and Mandible**

. Recent Gorilla Skull and Mandible *

. Recent Human Innominate *

. Recent Chimpanzee Innominate *

. Skull of Australopithecus africanus. From Sterkfontien, South Africa. About 2.5 million years old.**

. Skull, Mandible, and Endocast of Australopithecus africanus from Taung, South Africa. "Taung Baby", about 2-3 million years old.*

. Skull of Australopithecus boisei from Olduvai Gorge, Tanzania. Found by Mary and Louis Leakey. About 1.75 million years old.

. Skull and Mandible of Homo erectus from Choukoutien, China. About 300,000 - 500,000 years old.**

. Skull and Mandible of Early Homo sapiens (Neandertal) from La Ferrassie, France. About 40,000 - 60,000 years old.**

. Skull and Mandible of Homo sapiens, (Cro-Magnon) from Cro-Magnon, France. About 20,000 - 30,000 years old.*

. Skull and Mandible of Homo sapiens, (Mt. Carmel Man, Skull V) from Palestine, Israel. About 45,000 - 35,000 years old.

. Trinil Femur from Java, about 1 million years old. Used for comparative anatomy study purposes.

. Calotte of Homo erectus from Trinil, Java. About ½ - 1 million years old.

. Mandible of Homo erectus, (Mauer Jaw) from Mauer, Germany. About 400,000 - 600,000 years old.

. Stone Artifact Tools. Set of four stone artifact tools showing different shapes and usage, chopper, scraper, etc. **

** These casts are also used in both Science and Biology Unit Pathways
* These casts are also used in Biology Unit Pathway

Stock No.	Item	Cost of First Year Installation	Cost of Subsequent Years
407	FILMSTRIP AND CASSETTE, "WHAT IS PHYSICAL ANTHROPOLOGY?"	$ 20.00	-0-
	Sound filmstrip used in Anthropology Semester Course and Biology Unit Pathways to introduce students to the study of Physical Anthropology. Filmstrip emphasizes the interdisciplinary nature of Physical Anthropology.		
	TOTAL BASIC COST FOR IMPLEMENTATION OF ANTHROPOLOGY SEMESTER COURSE:	$1530.50	-0-

The cost of the Anthropology Semester Pathway on a per student basis varies according to the number of classes involved. Any number of classes can share the above materials if class scheduling is established at different periods or days. An example of student cost is as follows: (refer to the table below). However, should your funding be extremely limited, it is possible to teach the Anthropology Semester Course without purchasing fossil replica casts or calipers. By doing this, using the Student Laboratory Anthropology Prints in lieu of casts, the total expenditure for implementing the Anthropology Semester Course is $85.50.

Number of Classes	Number of Students	Cost of Program Per Student First Year Installation		Cost of Program Per Student Subsequent Years Installation
		With Fossil Casts $1530.50	Without Fossil Casts $85.50	
1	30	$ 51.00	$ 2.85	-0-
2	60	$ 25.50	$ 1.43	-0-
3	90	$ 17.00	$ .95	-0-
4	120	$ 12.75	$ .71	-0-
5	150	$ 10.20	$ .57	-0-

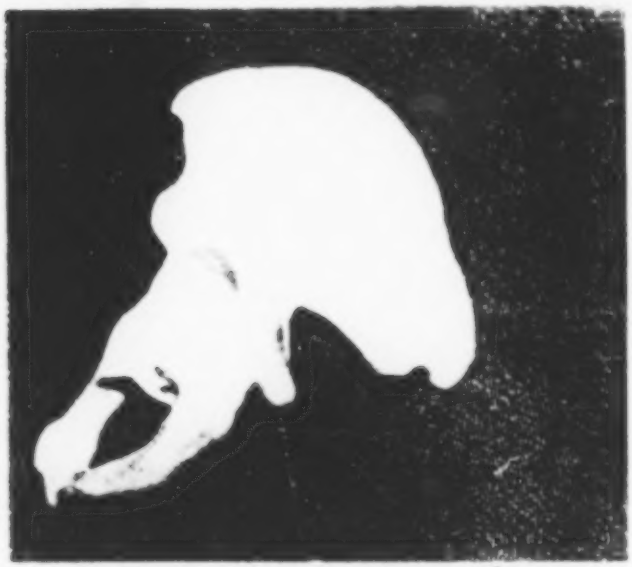
A NOTE ABOUT SHARING FOSSIL REPLICA CASTS BETWEEN SEVERAL PATHWAYS:

If you are already implementing the Biology or are considering a Biology Unit Pathway introduction at the same time, the cost of instructional materials for the Anthropology Semester Course materials will decrease the 1530.50 identified above to 540.50 since there are nine duplicate casts and set of artifact stone tools 930.00 and duplicate calipers 60.00 used in both programs. The revised 540.50 cost for one classroom of 30 students is 18.00.
For a complete listing of all available instructional materials produced by the "STONES AND BONES" Project, please refer to the general order forms.

*The cost of a cast is $100.00 each when bought as part of a complete Pathway. When bought individually, the cost is $125.00 each.

#1 Chimpanzee skull & mandible

#2 Gorilla skull & mandible



#3 Recent human innominate

#4 Recent chimpanzee innomina

STONES & BONES

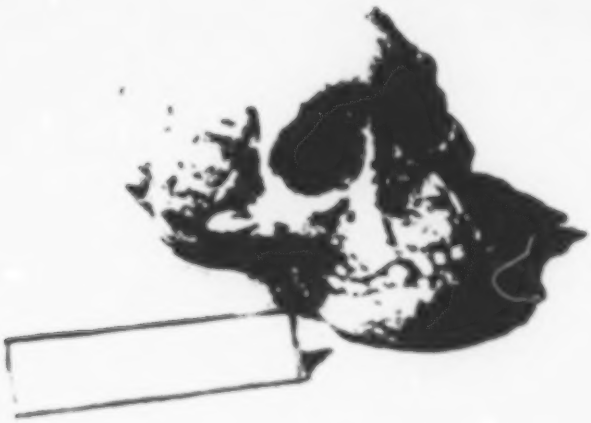
A LABORATORY APPROACH TO

Los Angeles Unified School District

PROFESSIONEL DEVELOPMENT BRANCH

1993

#5 *Australopithecus africanus* Sts V



#6 *Australopithecus africanus*
"Taung baby"

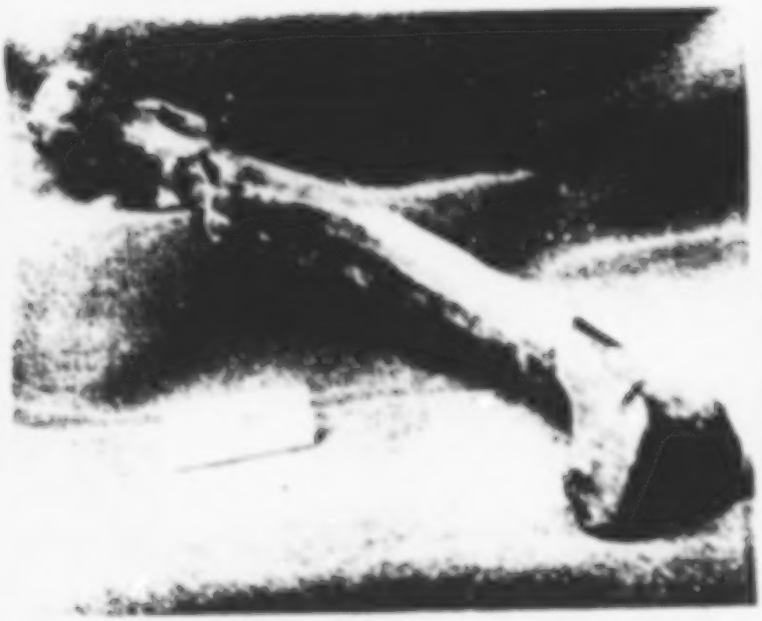
#7 *Australopithecus boisei*

#8 *Homo erectus* "Peking Man"

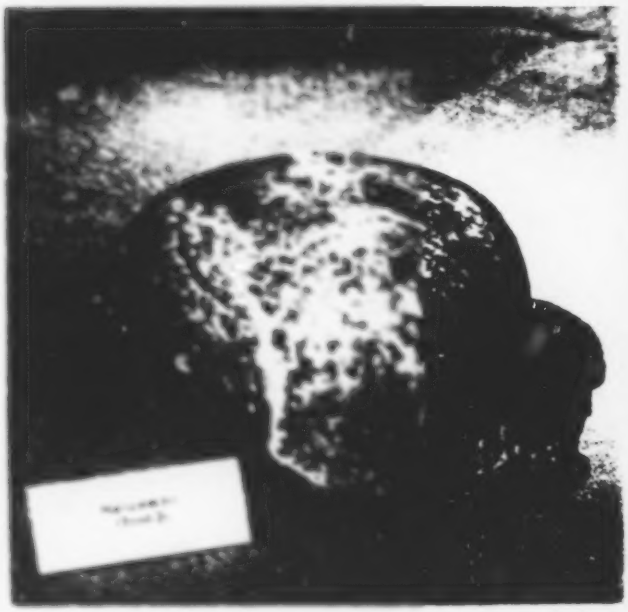
STONES & BONES
A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

#9 *Homo sapiens* "Neandertal"
La Ferrassie

#10 *Homo sapiens* "Cro-Magnon"



#12 Trinil femur

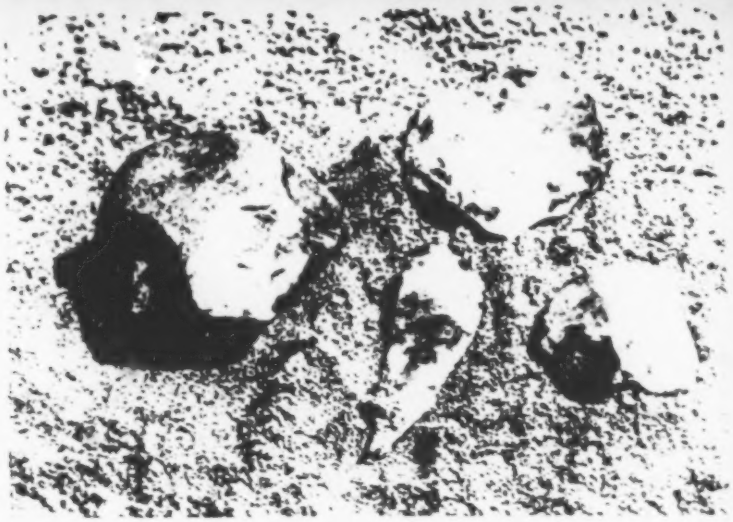


#13 *Homo erectus* calotte

STONES & BONES

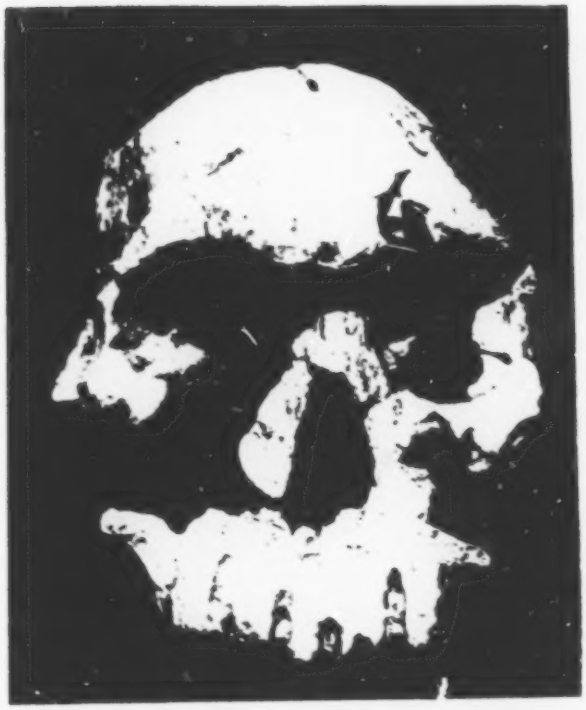
A LABORATORY APPROACH TO [illegible]

#11 *Homo Sapiens* Skhul V



#15 Stone artifact tools

#16 Recent Human Skull & Mandible



#17 *Homo habilis* KNM-ER 1470

Cranium & Face

STONES & BONES

A LABORATORY APPROACH TO PHYSICAL ANTHROPOLOGY

Los Angeles Unified School District
PROFESSIONEL DEVELOPMENT BRANCH
1993

LOS ANGELES UNIFIED SCHOOL DISTRICT
PROFESSIONAL DEVELOPMENT BRANCH
REFORM UNIT

PHYSICAL ANTHROPOLOGY CENTER
6625 Balboa Boulevard
Van Nuys, California 91406
(818) 997-2389 or (310) 472-6175

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AWARDS RECEIVED BY THE

"STONES & BONES" PROJECT

ON BEHALF OF LAUSD

- ESEA, Title IV-C grants received for project development - 1977 - 1980
- ESEA, Title IV-C grants received for California dissemination - 1980 - 1982
- National validation by the Joint Dissemination Review Panel in Washington, D.C. - May 1982
- Recipient of grant award from the National Diffusion Network for national dissemination - May 1983
- Received California School Boards Association certificate of Honorable Mention at Exemplary Golden Bell Awards Program - December 1982
- Received National Science Teachers Association recognition as 1 of 10 exemplary Biology program nationwide in NSTA 1982 Search for Excellence in Science Education - April 1983
- Received National Science Supervisors Association Certificate of Appreciation for our contribution to the excellence of science education - April 1983
- Received recognition as an examplary curriculum program in science by the Math/Science/Computer Task Force of the Industry-Education Council of California - May 1984

Science Education Programs That Work

A Collection of Proven Exemplary Educational Programs
and Practices
in the National Diffusion Network

Recognition Division, Programs for the Improvement of Practice

Office of Educational Research and Improvement
U.S. Department of Education, 555 New Jersey Avenue, N.W.
Washington, D.C. 20208

STONES AND BONES, A LABORATORY APPROACH TO THE STUDY OF BIOLOGY, MODERN SCIENCE, AND ANTHROPOLOGY. An innovative program designed to enrich and meet the present modern or life science, biology, and physical anthropology courses.

Audience Approved by JDRP for science students of all ability levels. The program has been successfully implemented in grades 7-12.

Description The program meets the needs of all ability students. The format is interdisciplinary in design and emphasizes active student participation through laboratory explorations. Modern (general) or life science and biology instructional units supplement, enrich, and extend current science curricula..

Three instructional pathways emphasize the study of humankind: *Modern (General) Science Pathway:* Designed to motivate non-college-oriented students. Each of the 20 laboratory explorations offers the general science student "hands-on" opportunities to investigate topics such as geologic time, measuring radioactivity, mapping, behavior of primates, and replica casts of fossil hominids. During this four to six weeks unit, students will also have an opportunity to simulate archaeological excavation.

Biology Pathway: A four- to six-week overview of physical anthropology. The unit provides students with "hands-on," in-depth experiences as a supplement to physical anthropology in biology textbooks. A series of 11 investigative explorations focuses on topics including primate behavior and distribution, interpreting archeological records, primate locomotion and morphology, and replica casts of fossil hominids. This approach reinforces and extends many basic concepts taught in the study of biology.

Semester Course Pathway: This pathway in physical anthropology provides students the opportunity to study the story of humankind in depth. Laboratory investigations pursue such topics as phylogeny through time, continental drift, locomotion and behavior of primates, classification and morphology, as well as 14 fossil replica casts of Australopithecus, *Homo erectus*, Neanderthal, and Cro-Magnon.

Instructional materials for all three pathways are highly self-directive, requiring minimal teacher training. In addition to printed materials, cast replicas of fossil casts and instructional materials used in the explorations have been validated to be scientifically accurate by the L.S.B. Leakey Foundation, Los Angeles County Museum of Natural History, and by world-recognized anthropologists from various major universities.

Based on the recommended bsaic materials needed for implementation, the start-up cost will be approximately $471 for modern (general) science unit, $895 for biology unit, and $1300 for semester course. An alternative is to implement the program with fossil cast photo reprints in actual size in lieu of the fossil replica cast; the cost will then be approximately $55 for each of the instructional pathways. Any number of classes can share the materials if classes are scheduled at different periods or days. There is no additional cost in subsequent years of operation.

Requirements "Stones and Bones" can be implemented in various ways. The selection of the pathway is determined by school and student needs. All three pathways require no special facilities or equipment. Existing classrooms and readily available items from any classroom such as rulers, scissors, and paste will be adequate. Teachers with none to minimal anthropology background will need no more than one day of training for initiating each of the three pathways successfully. Teachers' Guides for the three pathways are available to effectively implement the program.

Services Awareness materials are available at no cost. Visitors are welcome at project's demonstration school site by appointment. Training workshops are conducted at project sites and/or adopter sites with costs to be shared. Project staff is available to attend awareness meetings out of state with costs to be negotiated.

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